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Annual Report of the FEDERAL SECURITY AGENCY

1951

Public Health Service

FEDERAL SECURITY AGENCY

OSCAR R. EWING, *Administrator*

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Letter of Transmittal

FEDERAL SECURITY AGENCY,
PUBLIC HEALTH SERVICE,
Washington, D. C., October 31, 1951.

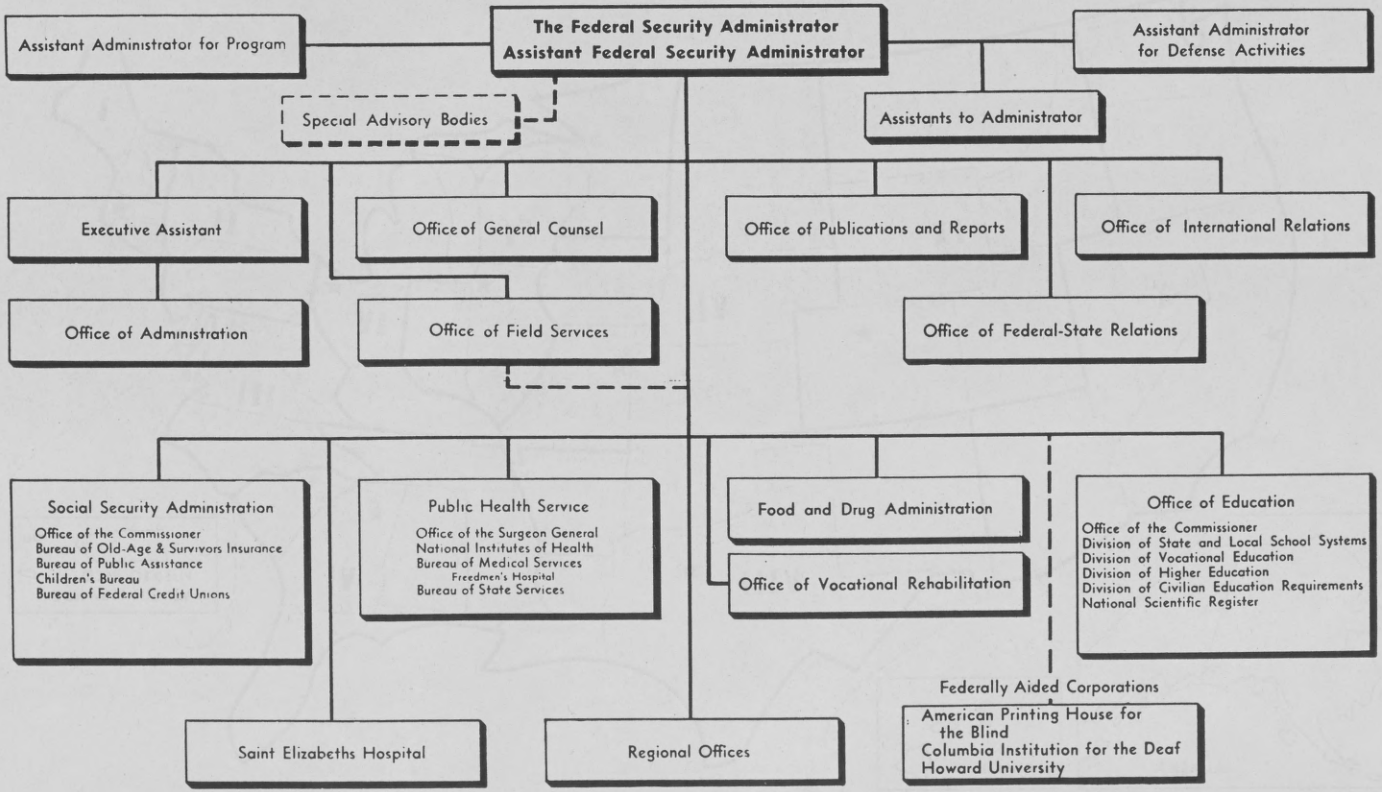
The Honorable OSCAR R. EWING,
Federal Security Administrator.

DEAR MR. EWING: In accordance with the act approved July 1, 1944 (PL 410, title V, sec. 511) I have the honor to submit for transmission to the Congress the seventy-ninth annual report of the United States Public Health Service for the fiscal year ended June 30, 1951, which is the one hundred and fifty-third year of this organization's existence.

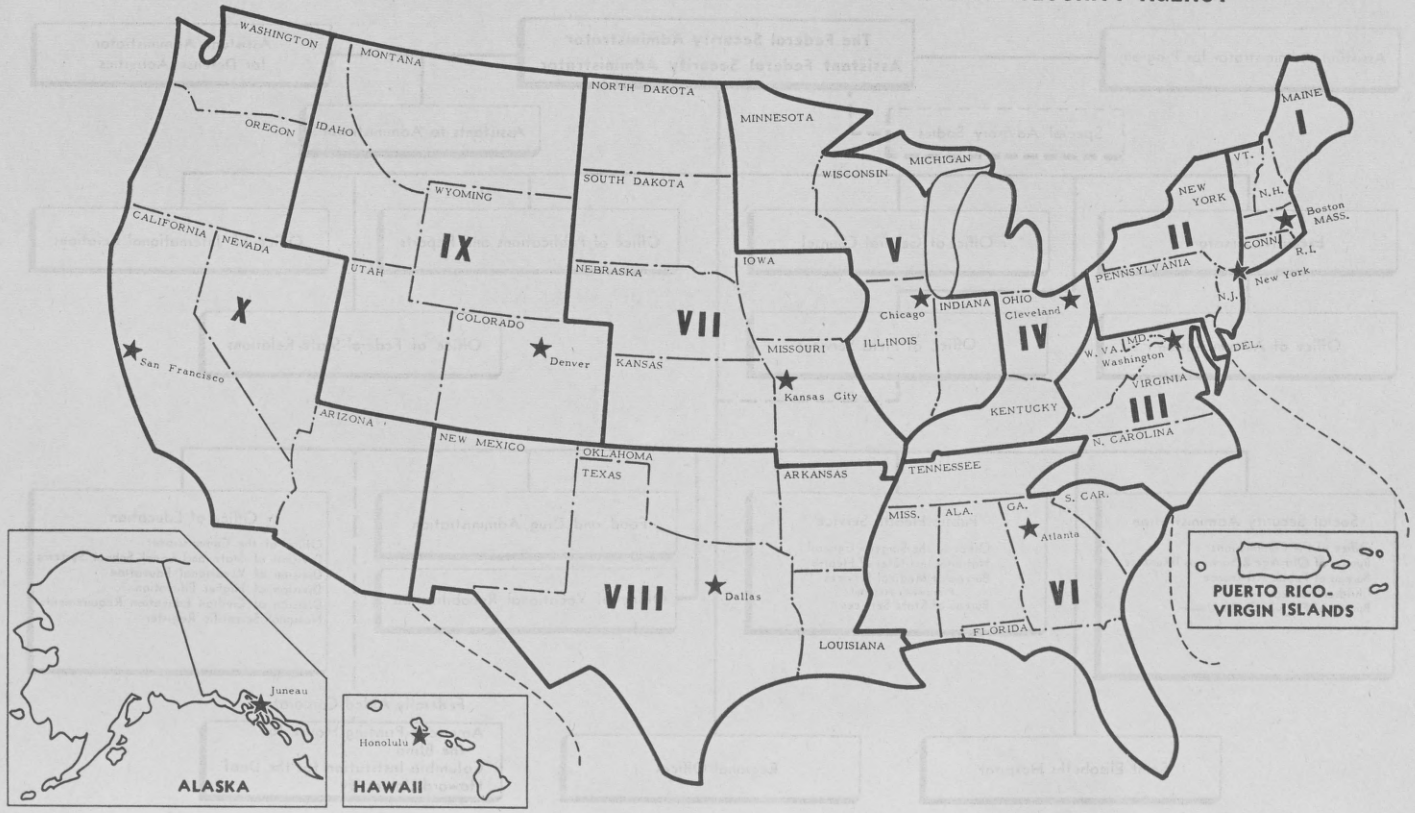
Respectfully,

LEONARD A. SCHEELE,
Surgeon General.

FEDERAL SECURITY AGENCY



REGIONAL AND TERRITORIAL AREAS AND OFFICES OF THE FEDERAL SECURITY AGENCY



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Public Health Service

GOOD HEALTH for Americans is a matter of vital national concern. It is a concern which is manifested in the framework of the Nation's health organizations—in the States and Territories, in local communities, in our large voluntary health organizations, and in the Federal Government through the Public Health Service.

This interest in health stems from the fact that the United States as a nation is dedicated to the individual—to enlarging his opportunities and to promoting his well-being. A healthy population is recognized as the basic source of our national strength.

Indeed, in the present emergency, nothing—save freedom itself—is so vital to the Nation as the continuing good health of its people.

Emergency Health Service

The impact of the national emergency has been felt with increasing intensity by the Nation's health organizations. As the Federal Government's principal source of highly trained personnel and facilities for the development and operation of health and medical programs for the civilian population, the Public Health Service has been concerned greatly during 1951 with problems connected with the emergency. In addition to discharging its normal function of safeguarding and promoting better national health, the Service has responded to increasing demands for advice and counsel, for the loan of experts, and for the staffing and conduct of special projects.

As will be indicated throughout this report, these demands have been many and various. They have ranged from assignments of personnel to foreign service projects conducted by other branches of the Federal Government to the development, in collaboration with still other agencies, of defenses against biological warfare. The impact of our expand-

ing defense industry on civilian health facilities and agencies, the health problems which have emerged in extracantonment areas as the armed forces have increased their strength, the demand for enlargement of research on blood and blood derivatives illustrate the scope of the Service's interests and activity in the area of national defense.

These special health problems should not, of course, be considered as distinct in themselves. Although they have grown out of a situation of emergency, their resolution will also contribute to our total national skills in research and to the development of techniques for prevention and early treatment of disease.

Coupled with the continued development of those long-range, established programs which are the core of the Public Health Service's work, they will add momentum to the steady increase in health gains which the Nation has enjoyed during the past 50 years.

The Nation's Health

During 1950, these gains in the national strength continued.[1] The estimated death rate of 9.6 per 1,000 population was the lowest ever recorded for the Nation, and a 10-percent lower death rate than in 1940. Heart disease and cancer continued as the foremost killers, accounting respectively for 354 and 140 deaths per 100,000 of our population. Together, cancer and the cardiovascular-renal diseases (including diseases of the heart, vascular lesions of the central nervous system, general arteriosclerosis, and chronic nephritis) caused more than two-thirds of the deaths in 1950. The slight increase in mortality from these chronic maladies in recent years actually reflects progress in combating other forms of illness; for cancer and the cardiovascular-renal diseases are associated with the gradually advancing age of the population, which, in turn, stems from marked gains in life expectancy. While an American born in 1900 could expect to live only 47 years, his descendants born in 1949 have an expectancy of 68 years.

The longer life line for the average man may be traced, in large part, to steady reductions in the death rates for the infectious and communicable diseases. For example, the estimated death rate from tuberculosis in 1950 was 22 per 100,000 population, about 50 percent less than the rate 10 years earlier. Gains in the fight against communicable diseases are shown also by the decline in reported cases during 1950. Smallpox incidence in the United States reached a new low of 42 cases; and statistics showed a steady downward trend in diphtheria and typhoid fever. For most other communicable diseases, reported cases fell below the 5-year median (1945–49). In-

[1] All vital statistics are given for the calendar year.

fluenza, pneumonia, meningococcic meningitis, amebic dysentery, and whooping cough were above the expected incidence. The 33,209 cases of poliomyelitis reported in 1950 represented, however, a 21-percent decrease from the all-time high of 42,173 cases for 1949.

There were 1,669,934 marriages in 1950, according to preliminary reports, an increase of 6 percent over the 1949 total. At the same time there was a drop in the number of divorces, from 397,000 in 1949 to an estimated 385,000 in 1950.

Nothing better illustrates the importance of broadened health resources and improved medical care than the record of infant and maternal mortality, both of which, in 1950, dropped to the lowest point ever reached in the United States. Infant mortality has fallen from 100 per 1,000 births in 1915 to an estimated 29 per 1,000 in 1950, while maternal deaths have dwindled from 57 per 10,000 live births in 1936 to an estimated 7 per 10,000 births last year. In 1950, an estimated 3,548,000 live births were registered. While no figures are yet available on the proportion of these deliveries made in hospitals, the trend in this respect is unmistakably clear. In 1949, 86.7 percent of all registered live births occurred in hospitals or institutions, and 95 percent of all live births were attended by physicians; while in 1935, the comparable proportions were only 36.9 and 87 percent, respectively.

The Public Health Service

Behind these advances toward longer and healthier American lives was the research of medical scientists and the expansion of hospital and health facilities. The steady drive against diseases and environmental hazards that sicken, cripple, or kill goes forward on every level—local, State, national, and international.

The United States Public Health Service plays a crucial part in this campaign. Its staff and its bureaus insure coordination of the multifarious efforts to stalk and conquer disease, conducting and stimulating research, aiding in the extension of health services and resources, and offering information and guidance to local and State agencies.

The Public Health Service employs about 17,000 persons. Of this total, 3,000 are physicians, dentists, veterinarians, sanitary engineers, and nurses. Another 500 are scientists with Ph. D. degrees. The remainder, numbering 13,300, constitute allied and supporting personnel. As of June 30, 1951, there were 1,263 regular and 1,162 reserve officers of the Commissioned Corps on active duty. In view of the national emergency with its extraordinary demands on trained health workers, the Service is attempting, wherever possible, to conserve professional manpower by utilizing less scarce types of personnel. Nonprofessional workers, for example, are now handling

many of the administrative procedures. Physicians and scientists engaged in research are assisted by qualified technicians, and sanitary engineers by sanitarians. Public Health Service hospitals are gradually increasing their complement of qualified practical nurses.

In the fiscal year 1951, the Public Health Service administered a total of $332 million in appropriations and authorizations. Nearly two-thirds of this sum was allocated in grants to agencies, institutions, and individuals outside the Federal Government. Six percent was devoted to the construction of needed facilities for the Public Health Service. The remainder covered the entire internal operations of the Service—its hospitals, medical-care programs, quarantine service, demonstrations, research activities, collection and reporting of vital statistics, technical aid to the States, and administration. Tables 1 and 2 present detailed information on the personnel and finances of the Service.

In matters of broad interest in the field of national defense, the Public Health Service during the year gave special assistance to the Department of Defense, the Selective Service System, the Atomic Energy Commission, the National Security Resources Board, the Office of Defense Mobilization and its constituent agencies, the National Research Council, the Federal Civil Defense Administration (FCDA), and other Federal agencies whose programs contain health and medical aspects with which the Service is uniquely equipped to deal.

The Public Health Service has devoted a great deal of its time and talents to the development of civil defense plans. Task forces of Service experts prepared the health and medical sections of the manual, U. S. Civil Defense, and the manual, "Health Services and Special Weapons Defense." The Emergency Health Planning Unit in the Office of the Surgeon General maintained almost full-time liaison with FCDA, the National Security Resources Board, and special committees of these agencies.

In the larger sense, however, as has been indicated, virtually all of the Service's activities add to the Nation's defense by adding to its health and productivity. The effort to win better health for the people of the United States must go forward on many fronts. The victory over cancer is still to be achieved. Much ground is yet to be won in the fight against heart disease. While research has pointed the path to progress in the drive against the arthritic ailments which cripple millions of Americans, this new opportunity has yet to be fully exploited. And while the total war against disease and impairment goes on, new hazards to health—some of them associated with industries crucial to defense—emerge each year in the American

environment. For the Public Health Service and for the innumerable agencies and individuals who are its allies in the campaign for good health, the achievements recorded in this report—like the achievements of the past—point the way to new problems and new accomplishments.

The Frontiers of Medical Knowledge

Progress in health depends to a large extent on the disciplined search for more knowledge about disease. The National Institutes of Health, at Bethesda, Md., constitutes the principal research arm of the Public Health Service and provides a center for coordination of research interests outside the Service.

The passage of Public Law 692 by Congress in August 1950, was a significant contribution to the development of the Public Health Service's research program. This law established two new institutes—the National Institute of Neurological Diseases and Blindness and the National Institute of Arthritis and Metabolic Diseases, the latter assuming the functions of the Experimental Biology and Medicine Institute, which was abolished. The creation of these new institutes prefaces a broader program of scientific investigation into such metabolic diseases as arthritis, rheumatism, diabetes, and peptic ulcers, and such neurological and sensory diseases as cerebral palsy, epilepsy, multiple sclerosis, glaucoma, and cataracts.

The same law authorized the Surgeon General of the Public Health Service to expand the functions of existing institutes or to establish additional institutes when necessary to study specific health problems. This provision is important in a period when new scientific discoveries frequently demand rapid shifts or extensions of research programs. Recent developments, for example, which indicate the value of radioisotopes and ACTH and cortisone as research tools have opened up whole new areas of investigation into many of our major health problems. Public Law 692 gives the Public Health Service the administrative flexibility necessary to meet such new challenges promptly.

The conversion of the law's provisions into operating programs was well under way by the close of fiscal 1951.

Public Law 692 also strengthened the Public Health Service's own research program by authorizing the establishment of 30 additional positions in the professional and scientific service at a higher level of compensation than has been possible in the past. As will be indicated, this law also broadened the membership of the seven Advisory Councils dealing with research grants.

On October 1, 1950, Assistant Surgeon General R. E. Dyer retired after 34 years in the Public Health Service. During the last 8, he had served as Director of the National Institutes of Health and guided the expanding research program at Bethesda, Md., with wisdom and distinction. Dr. Dyer's successor is Dr. W. H. Sebrell, Jr., formerly Director of the Experimental Biology and Medicine Institute.

The Clinical Center

The work of the scientists at the National Institutes of Health includes both research in the problems of a particular disease or disorder and research concerned with very general functions and structures of the human mechanism. Both are performed largely in the laboratory. The Public Health Service's Clinical Center, a 14-story research hospital which will be ready for occupancy early in 1953, will give the National Institutes of Health its first opportunity to conduct clinical research on a relatively large scale. With the mounting complexity of scientific research, the laboratory investigator and the clinical investigator have tended to become widely separated in both space and time. Findings made in the laboratory by one man are tested in the hospital or clinic by another; and the interlude between an original investigation and its clinical validation may be a matter of several years. The Clinical Center, which will have in immediate proximity to its 500 patients the resources needed both for clinical research and for basic laboratory investigations, will provide a special opportunity for making valid clinical studies on the basis of findings made in the Public Health Service laboratories and elsewhere.

The Research Facilities Planning Branch, which is responsible for planning the Institutes' comprehensive building program, reported that construction on the Clinical Center building was 59 percent completed at the end of fiscal year 1951. On June 22, 1951, the President of the United States participated in the laying of the cornerstone. "The fine record of Public Health Service research workers promises well for the future," President Truman declared on that occasion. "This magnificent building will give them many new opportunities to forge ahead in the field of medical discovery."

The Surgeon General expressed the goals of the Service for the operation of the Center in his address at the cornerstone ceremony. "Our plan is to operate this center so that medical investigators from all over the country may come here for short or long periods—to observe, to engage in our research programs, or to widen their perspective and that of our staff. We want the work done here to be of national interest, national participation, and national pride. We intend to make it so."

Research Grants and Fellowships

The functions of the National Institutes of Health reach far beyond the laboratories at Bethesda, Md. The Institutes are largely responsible for the administration of the extensive research grants program of the Public Health Service. The objectives of this program are to give financial support to medical and allied research in the Nation's research institutions, to encourage research in neglected subject areas, and to provide training for scientific personnel.

Seven National Advisory Councils, made up of non-Federal scientists and representative citizens with experience in national affairs, assist in this administrative task.[2] These councils review all applications for grants in their special research fields and make recommendations to the Surgeon General on their acceptability. By a provision of Public Law 692, this advisory structure was altered in 1950 to insure greater flexibility and effectiveness. Each of the seven councils now includes six members outstanding in public affairs and education, as well as six distinguished scientists. Policies governing the distribution of grants, therefore, are determined after careful consideration by well-balanced groups with a broad perception of both public and scientific needs.

During fiscal year 1951, the councils considered 2,283 applications, of which 1,724, totaling $17,304,529, were approved by the Surgeon General for payment during the year.

SCOPE OF RESEARCH SUPPORTED BY GRANTS

The Division of Research Grants at the National Institutes of Health, in addition to coordinating the research grants program, administers those grants that are not within the purview of a particular institute. The Division, during 1951, administered 595 grants in the amount of $5,513,617.

In the field of physiology, emphasis in grant applications has been shifting toward neurophysiology and sensory diseases. Approximately one-third of the requests in this field in 1951 proposed studies in these specialties.

Investigators in morphology and genetics are increasingly engaging in studies of cell physiology and chemistry. The relation between cell chemistry and cell structure is being studied by isolating cellular constituents and determining their biological properties. Relations

[2] National Advisory Cancer Council, National Advisory Mental Health Council, National Advisory Heart Council, National Advisory Dental Research Council, National Advisory Arthritis and Metabolic Diseases Council, National Advisory Neurological Diseases and Blindness Council, National Advisory Health Council.

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between the nucleus and cytoplasm of the cell under different conditions are also being investigated.

Progress was reported in the correction of heart abnormalities, particularly in dealing with mitral stenosis. In other surgery projects advances were made in skin and bone grafting and in wound healing. Support was also given to new projects in the field of shock.

In pharmacology, research projects to determine the fundamental nature of drugs are numerous. Many investigations have concerned analgesics. One project being carried on during the fiscal year yielded sensitive methods for identifying and measuring morphine and similar drugs present in body tissues following therapeutic dosage. Studies of the barbiturates and certain drugs used against epilepsy which are also under way could lead to the synthesis of better agents and to improvement in the treatment of drug poisoning.

Projects in tropical medicine are focused on the search for chemotherapeutic agents against amebiasis, malaria, schistosomiasis, and onchocerciasis. Despite advances in the treatment of malaria during the war, this remains the most important disease in tropical regions. Improved methods for suppression and cure have been developed.

In the field of environmental health, progress continues in the study of sanitation, water supplies, and related problems. Attempts are being made to develop more economical methods for bacteriological, chemical, and physical analyses in the fields of water supply and sewage disposal. Air hygiene is receiving attention, particularly with regard to asbestos and chromate dusts as possible agents of lung cancer in industrial workers.

Fundamental investigations in biochemistry and nutrition are increasing, with a view to tracing the processes leading to normal as well as abnormal conditions. Studies in this area concern, for example, nutritional factors in the origin and growth of tumors, the nutritive requirements of micro-organisms, and the biochemical basis for development of resistance by mouse leukemias to folic acid antagonists.

The Division during the fiscal year sponsored a number of seminars on specific research problems, including one on metabolic disturbances during surgical treatment and one on recent advances in the study of venereal diseases.

RESEARCH FELLOWSHIPS PROGRAM

Through the Research Grants Division of the National Institutes of Health, the Public Health Service continued its program of awarding fellowships to aid in developing competent research workers in the medical and related sciences. During the past fiscal year, 1,170 applications for fellowships were received and 549 were awarded. The awards comprised 225 predoctorate, 296 postdoctorate, and 28 special

fellowships. At present, there are 442 fellows receiving support at 71 institutions in 32 States, the District of Columbia, and 8 foreign countries.

RESEARCH MANPOWER

In February 1951, the National Advisory Councils met in joint session and made the following recommendations as to research manpower needs and policies in the present national emergency:

(1) Because adequate levels of highly trained manpower for national defense would not be maintained under the Universal Military Training and Service bill before Congress, provision should be made, either through deferment or selection after induction, for study in the physical and natural sciences, engineering, and related fields.

(2) The medical and health fields should be represented on the board established by the President for the selection of inductees.

(3) Reserve policies should be promulgated to clarify the status of thousands of scientists.

(4) The research grant policy of the Public Health Service should continue to be the support and stimulation of studies of medicine and allied sciences.

"The continuity of basic research is the foundation and first requirement of all applied research necessary to maintain the national health in times of emergency," the Councils observed.

Microbiological Research

The Microbiological Institute, in collaboration with the Communicable Disease Center in Atlanta, Ga., drew up plans during the year to hold a series of meetings with laboratories throughout the country in the interests of expanding investigation of many virus, rickettsial, mycotic, exotic bacterial, and veterinary diseases transmissable to man.

These meetings are aimed ultimately at the development of faster, more accurate identification of disease agents, better immunization procedures both before and after exposure, and better modes of treatment for such diseases. The laboratories are experienced in diagnostic and control procedures, and will also act as a network to materially strengthen the Nation's defenses against communicable diseases and, in collaboration with the Federal Civil Defense Administration, against biological warfare.

Through the Influenza Study Program, a trial run was undertaken this past year to determine how quickly a vaccine might be produced in sufficient quantity to help prevent Nation-wide epidemics of especially virulent strains of influenza virus. Using a virus strain flown

from England last January, 1,000 doses of a vaccine were produced by one laboratory within 21 days; another in 23 days. The coordination developed between the Influenza Study Program and the commercial drug manufacturers in this trial run provided the Public Health Service with a mechanism that may be extremely useful in the event of epidemic emergencies.

The Microbiological Institute, in its own laboratories, developed a quick, simple diagnostic test for trichinosis which may prove to be applicable to many other diseases. The test requires only a few minutes and may be performed without special equipment or specially trained technicians, in contrast to most of the older diagnostic tests which require several days and highly trained personnel.

During fiscal year 1951, the National Microbiological Institute made a number of other significant contributions.

Among them were methods for speeding the processing of blood plasma and assuring better sterilization. A monitoring device for constantly measuring and recording the output of ultraviolet light was developed which makes possible the maintenance of irradiation at levels sufficient for plasma sterilization. A special pump for delivering a constant and steady flow of plasma within a sterile closed system was also devised which will greatly simplify and expedite the processing of plasma. Both show promise for commercial use.

A method also has been found to adapt the Leon strain of poliomyelitis to mice. Further work is being carried out to make this adaptation complete enough for practical laboratory use.

A fairly widespread disease of childhood—herpangina—has been recently rediscovered, almost 30 years after it was first reported, and its causative agent isolated. The disease, which is caused by the Coxsackie group A viruses, was first described in 1948. Further experiments with Coxsackie virus carried on through the Microbiological Institute have revealed that, contrary to popular belief, these viruses do not cause illnesses similar to or identical with poliomyelitis.

In preliminary tests of vaccines which might be used in the control and prevention of Q fever in dairy herds, it was found, through blood tests of vaccinated and nonvaccinated cows, that three times as many nonvaccinated cows were infected. In examination of their milk for Q fever infection, five times as many nonvaccinated cows showed evidence of infection.

Experimental work with penicillin, undertaken by the Institute to discover why treatment with antibiotics sometimes unaccountably fails, indicates that while penicillin may cure a new infection in 2 to 4 hours, it may fail to cure an old infection of the same disease even when treatment is continued for 72 to 96 hours. Such failures—found true to a lesser extent in treatment with aureomycin and chloro-

mycetin—are apparently due to the fact that in old infections the organisms are not actitvely multiplying and are therefore not susceptible to the drug's action.

SPONSORED RESEARCH IN MICROBIOLOGY

During fiscal year 1951, the National Microbiological Institute undertook an extramural program for the administration of research grants and research fellowships in the major fields of microbiological research. At the June meeting of the National Advisory Health Council, which continued to review grants in this field as well as in those areas which are not the functional responsibility of the categorical institutes, 66 research grants were awarded totaling $542,942. Part of this amount was allocated to the sectional laboratories already mentioned which are participating in the expanded Public Health Service program for defense against the communicable diseases.

Arthritis and Metabolic Diseases

To promote more extensive research in the field of arthritis and rheumatism—chronic illnesses that afflict an estimated 7 to 8 million persons in this country—the National Institute of Arthritis and Metabolic Diseases was created on November 22, 1950.

In few fields is the need for research more acute. According to insurance statistics, nearly 9 percent of all sickness and 15 percent of absence from work among wage earners are due to arthritis. It is the world's greatest crippler.

In preparation for its expanded responsibilities, the new Institute has appointed a chief for clinical research and a chief for extramural programs. Limited programs have been launched in each of these areas.

RESEARCH FINDINGS

Investigations of shock and radiation injury, inaugurated by the former Experimental Biology and Medicine Institute, have continued in the past year. Clinical evaluation has begun of the value of salt and soda in the treatment and prevention of shock in badly burned individuals. It has been shown in experiments with mice that oral saline prevents death from traumatic shock without causing substantial early changes in circulatory disturbances.

In collaborative studies with the Naval Medical Research Institute, scientists have been able to isolate good quantities of apparently unaltered blood platelets from dogs, guinea pigs, and humans. Prevention of hemorrhage, one of the principal hazards of radiation injury, by transfusion of these platelets has proved successful in experi-

mental animals. Further progress has been made in studies of the mechanism of radiation injury and in the evaluation of antibiotics for combating this condition.

Test methods have also been developed for small amounts of ACTH and cortisone, which will be of great assistance in metabolic studies involving these important drugs. An enzyme system prepared from adrenal glands has been shown to transform other adrenal steroids to compound F, one of the two steroidal hormones (the other is cortisone) which are effective in the treatment of arthritis. The search for plant sources of starting materials for the manufacture of cortisone and other useful steroids has continued. Studies have demonstrated that tomatidine, readily obtainable from the tomato plant, can serve for the production of steroidal sex hormones and, possibly, cortisone. Solasodine has been found to have similar value.

The drug N-allylmorphine has proved to be of value in counteracting the harmful effects to the fetus of morphine or other analgesics given the mother. This may have considerable importance in human obstetrics.

Progress has continued in research in the field of nutrition. Scientists have shown in experimental animals that large amounts of ascorbic acid (vitamin C) or small amounts of antibiotics reduce greatly the dietary need for most of the B vitamins. A new factor which supplies protection against dietary liver injury has been demonstrated. Two new compounds of biological importance have been obtained in essentially pure form: the so-called "citrovorum factor," and a metabolite containing glutamic acid which appears in the urine of animals treated with sulfasuxidine, causing a deficiency in folic acid. It also has been demonstrated that diets containing abnormally large amounts of iron, when fed to rats, led to anemia and other blood conditions which may be corrected with folic acid.

It has been demonstrated that the thyroid gland has a controlling influence on the synthesis of protein. These studies have indicated that rats whose thyroids have been removed have responded to force feeding by increased accumulations of fat but not by bone growth or protein deposition.

Electron microscopy has provided deeper insight into the nature of viruses and the way in which they grow and multiply. A new method of measurement, some 100 times more sensitive than that in previous use, has permitted studies of photosynthesis which may explain the low quantum values widely discussed in recent months.

RESEARCH GRANTS

The newly formed National Advisory Arthritis and Metabolic Diseases Council reviewed 55 applications for research grants in the past

year. Forty-four of these were recommended by the council and approved by the Surgeon General. The grants totaled $533,656 and went to 33 institutions in 16 States and 1 foreign country.

The Fight Against Cancer

Research in the National Cancer Institute's laboratories and cooperating clinics, cancer control activities, and support of research in non-Federal institutions progressed steadily during the past year. The program of clinical investigation, expanded in 1949–50, continued to provide cancer patients with the latest benefits of medical science while permitting bedside study of the disease.

Highlights of the year, apart from laboratory and control activities, included the first national conference on cancer diagnostic tests; progress in the analysis of cancer morbidity data collected in a survey of several metropolitan areas; and publication of a 329-page monograph compiling the chief references to studies on tumor chemotherapy in the world's literature.

CANCER RESEARCH

Little by little, contributions are made to the stockpile of knowledge about cancer. The findings reported below indicate a few of the advances made in cancer research during the year.

Treatment with folic acid antagonists gives leukemic animals only temporary relief, but administration of more than one antileukemia agent at a time shows encouraging results.

Studies of metabolism have shown that the oxygen consumption of tumor cells decreases markedly when they are placed in a solution containing salt at normal blood levels; that cancer tissue and the tissues of cancer-bearing animals synthesize iron-containing compounds to a lesser extent that do tissues of the normal animal; and that the intracellular particles known as mitochondria consist largely of proteins, of which the most prominent in normal liver cells is absent from cancerous ones.

In cancer virus studies, wild house mice were shown to carry the mammary tumor agent found in certain highly inbred strains of laboratory animals.

A "therapeutic index" was determined for approximately 200 compounds previously shown to damage tumors in mice when administered at a near lethal dose. The 46 chemicals with the highest index will be studied further.

When irradiation of animals was followed by intravenous injection of homologous bone marrow, survival was greatly enhanced. These studies may lead to a method of preventing injury during irradiation

therapy and may increase the chances of survival following irradiation from atomic bombing. Also of possible clinical value is the finding that the sensitivity of a lymphosarcoma in the mouse can be altered by keeping the animal under oxygen prior to and during irradiation.

It was discovered that leucocytes are removed from the blood by some mechanism within the pulmonary circulation, and that impairment of this mechanism is one of the factors involved in the high leucocyte count in leukemia.

A possible aid in diagnosis when the symptoms include jaundice or enlargement of the liver is the finding of a chemical difference in the blood of patients with liver cancer and of those with certain other liver diseases. Studies are under way to evaluate such a test.

It was observed that administration of the hormone progesterone will induce regression of cancer of the cervix and diminish pain and bleeding.

Several important tools and techniques for research were developed during the fiscal year. One is a high-precision automatic interference refractometer, which may provide a method for separating and analyzing proteins that cannot be separated by other means. Another is a new method for producing transplantable thyroid tumors in mice. Still another is a technique by which cells from glandular epithelial tumors can be made to reproduce the glandular structure in tissue culture—a finding that may aid pathologists in diagnosis.

CANCER RESEARCH GRANTS AND FELLOWSHIPS

Research studies outside the Federal Government through grants to private institutions continued. Approximately $3,900,000 was recommended to support projects in 134 institutions in 35 States, the District of Columbia, Puerto Rico, and 6 foreign countries. Cancer research facilities were expanded through completion of 24 construction projects receiving grant support, and construction of 22 others was begun with funds previously obligated. Training and experience in cancer research were provided through the award of fellowships to 173 persons.

CANCER CONTROL

A total of $3,200,000 was alloted to support the official cancer control activities of the States, Territories, District of Columbia, and Puerto Rico. Provision of better diagnostic and treatment service, the basic objective of these activities, was advanced through teaching grants to 124 medical and other educational institutions; through 113 clinical traineeships to physicians; and through educational activities in cancer nursing. A major contribution was the monograph, "Can-

cer Nursing in the Basic Professional Nursing Curriculum," prepared by a committee sponsored by the Institute.

In an effort to improve knowledge in the cancer control field, 64 special projects were aided with grants totaling $980,000. The search for new diagnostic tools received extensive support, with appreciable gains in this area. Investigations of environmental factors related to cancer causation were also emphasized. These studies elucidated the relation of finely dispersed metallic nickel powder to the causation of cancer in rats.

Two new educational films, "Breast Self-Examination" and "Gastro-intestinal Cancer," were produced jointly with the American Cancer Society. Approximately 1,000 prints of "Breast Self-Examination" have been sold—more than 4 times the sale of any previous film in the public health field. It has been viewed by nearly a million women.

The National Heart Program

Advances on many fronts marked the third year of the National Heart Institute, established in 1948 to lead and coordinate the Public Health Service's program dealing with heart disease. In intramural research, considerable progress was made toward increasing basic and clinical knowledge of the underlying disease processes affecting the heart and circulation. Through a comprehensive grants program, expanding research activities in universities and hospitals throughout the Nation were fostered and supported. Significant gains were also made in training in both the research and clinical aspects of the heart diseases. Through cooperative efforts with the Bureau of State Services, the public health control of heart disease was stimulated and moved steadily forward in many States and local communities.

The impact of heart disease on national health is great. It accounts for one out of every two deaths. Nearly 10 million Americans have heart disease. The suffering, disability, and economic loss resulting from it are incalculable. The eventual solution of the heart disease problem depends largely upon the discovery of new knowledge concerning its causes, prevention, treatment, and cure. Hence the principal emphasis of the National Heart Institute is on research.

ADVANCES IN HEART RESEARCH

The cause of arteriosclerosis and coronary artery disease is a subject which researchers have approached on several lines. Investigators variously hold that the fundamental metabolic defect which results in the sclerotic or hardening process in arteries is one that precludes normal handling of cholesterol, fosters the formation of large protein-

fat complexes in blood plasma, or impairs the ability to regulate phospholipid metabolism. Institute investigators premise that the three possibilities are interrelated one with another, with metabolic handling of small energy yielding particles and with the synthesis of abnormal protein molecules. Their approach has developed chemical methods for the estimation of serine, ethanolamine, and choline, which are the basic building blocks of the fatty substances in the body called phospholipids. The methods will permit, for the first time, a definite study of the individual components of the four distinct types of phospholipids.

While the major cause of hypertension is not known, the simple lowering of blood pressure is conducive to lesser cardiac disability, consequently to a longer and more useful life. Considerable progress has been made by the Institute's researches in the endocrinological aspects of the hypertensive condition, the study of synthetic blood pressure lowering agents, and the isolation from natural sources, both plant and animal, of pure principles which have the property of raising or lowering blood pressure. The serial study of a number of drugs which have the ability to lower blood pressure has determined certain of their inherent limitations. This has led to establishment of experimental hypotheses that permit the synthesis of other chemical agents which will have more suitable biological properties.

Investigations in the broad problem of the failing heart seek to clarify biochemical reactions in cardiac muscle whereby the energy required for contraction is provided from chemical nutrients which serve as fuel. The underlying biological mechanisms responsible for raising small carbon fragments from low to high energy values have been isolated for study. Certain of the mechanisms through which high energy carbon fragments are utilized in transfer of energy from one organic complex to the other have been clarified. Progress has been made in isolation and study of tissue catalysts involved.

Other studies have provided data which are applicable to better understanding of the circulatory system as a whole, the control of fluid and electrolyte composition of the body, and mechanisms implicated in the syndrome of heart failure. Certain kidney mechanisms concerned with retention or excretion of salt and others which determine acidification or alkalinization of body fluids have been isolated. These accomplishments are essential to development of a more rational basis for the use of diuretics. Experimental preparations have been produced which simulate the circulatory phenomena in cardiac failure. It is quite certain from these studies that the endocrines play a role which is as important as either the heart or the kidney in the precipitation and continuation of heart failure.

The cardiac patient is vulnerable to surgical procedures involving strong sedation and general anesthesia, particularly if the latter is required for more than a short period of time. Study of pentothal, the most commonly used "short-acting" intravenous anesthetic, has shown that the drug has the serious disadvantages of progressive localization in the fat of the body and a slow rate of inactivation. Administration of anesthesia for a long period results in accumulation of a large amount of pentothal in the body, which produces a postanesthetic depression of excessive duration. This has led to the study of a number of new compounds derived from or related to barbituric acid, and one that appears to have suitable characteristics is under clinical trial.

The most commonly used anticlotting drugs produce their effect through an indirect action on the clotting mechanism and are now known, as a result of Institute investigations, to be inherently difficult to control. On the other hand, heparin and heparin derivatives, which are more suitable for such a purpose, are biological in origin, short in supply, and inordinately expensive for continued therapy. Work has been undertaken in the expectation of devising a suitable synthetic substitute for heparin which can be produced at low cost.

Research on instrumentation has also been rewarding. Advances include the development of a mechanical pump which permits, in the experimental animal, the complete bypassing of blood from either of the two sides of the heart. The advantages which accrue to cardiac surgery from the availability of a bloodless interior chamber of the heart are under study. The device is not yet ready for application to the human. Preliminary work has been completed on a new optical tool to analyze the fluorescent light emitted by low concentrations of organic substances, including drugs. When perfected, it will constitute a powerful tool in the exploration of both new and old therapeutic agents.

GRANTS FOR HEART DISEASE RESEARCH

Important discoveries were made by a number of scientists whose research was supported by National Heart Institute grants. Studies were conducted on all aspects of heart disease, with many investigations dealing with the major problems of rheumatic fever, hardening of the arteries, and high blood pressure.

A valuable contribution to the treatment of coronary thrombosis was made with the discovery of a method to diminish and, in many cases, eliminate the crushing pain that accompanies a heart attack. This research found that an ethyl chloride spray, applied externally, will "freeze" the pain centers and stop the spasms which cause contraction

and impairment of the surrounding circulation. Once the immediate pain has been relieved, it apparently does not recur and thus allows the patient to conserve strength for the healing period.

Among the achievements accomplished through surgical research was development of a new technique for the repair of mitral insufficiency, the leaky valve condition that often occurs in rheumatic heart disease. In this method a piece of the pericardium, the sac enclosing the heart, is pulled through the heart and attached so that it will loosely move against the damaged mitral valve. The operation, performed under control of the surgeon's finger within the heart, has been immediately effective in a high percentage of cases treated.

Studies in hypertension have revealed that nearly all persons with high blood pressure have a chemical in their blood which is not present in individuals with normal pressure. This powerful substance, called pherentasin, is found in very minute amounts. When injected into rats, it quickly raises blood pressure. The discovery points the way to a possible new treatment for hypertension. The scientists are now studying drugs which may neutralize pherentasin and thus help to keep blood pressure normal.

RESEARCH ON BLOOD

Of increasing importance, in view of the international situation, the action in Korea, and the threat of atomic bombing, is the National Blood Program. Responsibility for research and development of blood and its derivatives was delegated to the National Heart Institute. More than a score of expert investigators were given grants to carry out urgent blood research.

Remarkable progress has been made. Resuspended red blood cells can now be stored up to 3 months. Globin derived from red cells which are discarded in present methods has been found to be effective and safe in treating shock when given with salt or glucose solution. This globin might substitute for plasma and reduce the amount of plasma needed. A new method for separating stable fractions of plasma from those fractions which are easily destroyed by standing or by changes in temperature was developed. Automatic devices were designed to make sure that plasma-sterilizing machines function properly. Advances were also made on processes for the partial recovery of outdated blood.

Dental Research

The National Institute of Dental Research has continued to devote its major efforts to the study of the causes and control of dental caries.

However, there has been increasing emphasis on basic investigations relating to other diseases associated with the teeth and their supporting tissues.

The collaborative study at Grand Rapids and Muskegon on the effect of fluoridation of water supplies for partial control of dental caries continued. The number of examinations made this year was increased to include children in three additional grades in addition to groups previously studied. The results of these observations indicate that dental caries experience has been reduced in Grand Rapids by approximately 65 percent in the younger school children (5 to 7 years of age) and by about 20 percent in the older children (13 to 14 years of age). The bacteriological and physiological aspects of the study were continued.

A study has been made of the relationship of fluoride to dental caries in the case of adults who have a lifetime history of drinking a natural fluoride-containing water. The results indicated a marked reduction of dental caries in persons up through age 44. This group had about 60-percent fewer decayed teeth and lost only about a fourth as many teeth as another group of adults with a continuous history of drinking a fluoride-free water.

Another investigation concerned the rate of calcification of the wrist bones of children reared in areas where the public water supplies contained natural fluoride in concentrations from about 3.9 to 4.4 parts per million. The results were compared with those obtained with a control group of children reared in an area where the public water supply was free of fluoride. No essential difference was found.

In their studies of rat caries, scientists at the Dental Institute have succeeded in formulating diets on which the animals develop caries of the buccal and labial tooth surfaces. As a result, it is now possible to study this type of caries (common in humans) experimentally in rats.

A method has been developed and successfully used for the preservation of viability and pathogenicity of the virulent Nichols strain of *Treponema pallidum* (causative agent of experimental syphilis in rabbits) when dried from the frozen state. This work was conducted by an American Dental Association Fellow on duty at the Institute.

Methods have been developed for the preliminary handling and embedding of dental tissues, from which suitable thin sections can then be cut for direct electron microscopic examination. This is an important advance in electron microscopy, because it is now possible to study the ultrafine structure of teeth in preparations similar to those long used in optical microscopy.

Extensive investigations have been made of the organic framework of mature and also of developing enamel and dentin. Scientists have

found a submicroscopic fibrillar network that permeates the substance of mature enamel. This network does not appear to be performed, but rather to develop during calcification.

DENTAL RESEARCH GRANTS

The dental research grant program, which is intended to stimulate the interest of dentists in research and to enlist the aid of dental investigators in the basic sciences, was continued. Thirty-six research projects were supported by dental research grants in the past year. The fellowship program supported the work of 16 dental researchers.

The National Mental Health Program

In 1948, less than half of the States in the United States had mental health programs to meet the needs of the emotionally or mentally maladjusted, and to maintain mental health.

In 1951, all States had such programs and were spending almost $2 to every $1 contributed by the Federal Government. This ratio was $1 to $1 in 1948. In 1951, Public Health Service grants to the States of $3.5 million were almost doubled by State and local funds totaling $7,296,000. These funds—almost $11,000,000 plus $1,000,000 of private funds—were spent for community clinic services, and for educational and consultant services. These control efforts, which, on the basis of present psychological and psychiatric knowledge, frequently succeed in preventing adjustment difficulties from becoming serious mental health problems, are being constantly expanded. A suggested State draft act which the Institute prepared in the fall of 1950 has become the basis for revisions made by a number of State legislatures in their laws governing mental health. In addition, at the request of State governors, the Mental Health Institute has provided consultative services to 23 psychiatric hospitals and institutions in Illinois, Colorado, and South Dakota. Their recommendations have been utilized for the improved hospital care of the mentally disturbed.

The National Institute of Mental Health also maintained close cooperative working relationship with the States on two growing national problems—alcoholism and drug addiction. Through special grants made by the Institute, the services of qualified organizations were used to secure further knowledge about the social and psychological conditions conducive to drug addiction among minors. In June 1951, a conference of several constituent units of the Federal Security Agency was sponsored by the National Institute of Mental Health to survey current knowledge of the problem and to plan a coordinated program of action.

In cooperation with State and local agencies, the problem of alcoholism was surveyed throughout the country as a preliminary step toward developing a program for its control. A special project grant was made to the Yale Center of Alcohol Studies to support a comprehensive survey of existing research on the problem of alcoholism and methods of education and treatment to combat it.

MENTAL HEALTH PERSONNEL

To develop the training of specialized personnel in all areas of mental health—now inadequate to meet the need—the Mental Health Institute has been able to provide 186 training grants to various non-Federal universities and institutions to promote the expansion of graduate teaching programs in psychiatry, clinical psychology, psychiatric social work, psychiatric nursing, public mental hygiene, and neurology.

Grants were awarded to 42 medical schools to provide undergraduate psychiatric education. Other grants were made to finance five institutes for public health officers, nurses, psychologists, and psychiatrists in public health mental hygiene, and a conference on undergraduate psychiatric education sponsored by the American Psychiatric Association.

RESEARCH ACTIVITIES

While the full development of the Public Health Service's program of research in mental health awaits the completion of the Clinical Center with its laboratory facilities, plans for its expansion are now being crystallized. The recent appointment of Dr. Seymour S. Kety as scientific director for both the Mental Health Institute and the National Institute of Neurological Diseases and Blindness emphasizes a research approach which will explore both the organic and functional bases of mental and neurological disorders.

Cooperative research projects were conducted with other institutions. At the Worcester Foundation for Experimental Biology, for example, scientists of the Foundation and scientists from the Mental Health Institute studied the output of adrenal cortical hormones in normal groups and in groups of schizophrenic patients in an attempt to assess the role of the adrenal cortex in mental disorders.

DRUG ADDICTION

Research on barbiturate and drug addiction at the Addiction Research Center of the Public Health Service Hospital at Lexington, Ky., continued to yield significant results. Study was continued on the development of synthetic analgesics as substitutes for mor-

phine. Battlefield experience in Korea confirmed the value of methadon as a valuable analgesic which could be given by mouth. The development of methadon frees the United States from dependence on imports of foreign opium—from which morphine is derived—a matter of considerable importance in event of total war. Experimentation at Lexington, Ky., also demonstrated that withdrawal effects following barbiturate addiction included epileptic-like convulsions and psychoses.

RESEARCH GRANTS PROGRAM

Under the Mental Health Research Grants program, several other important findings have been made in the past year. One of the studies in psychosomatic medicine has revealed a significant correlation between personality characteristics and the rates of pepsinogen secretion in patients suffering from duodenal and peptic ulcer and from pernicious anemia. Another project has revealed important facts relative to behavioral contagion among groups of emotionally disturbed children, and the data are being used to develop new techniques of childhood social adjustment.

Neurological Diseases and Blindness

The National Institute of Neurological Diseases and Blindness, established in the summer of 1950, has already initiated its program of medical research grants and a program of fellowships and traineeships to support the training of qualified personnel for fundamental research and investigation of more effective methods for treatment and rehabilitation in the crippling neurological diseases.

GRANTS FOR TEACHING AND RESEARCH

Because no funds were available for the operation of the new institute during fiscal year 1951, grants in neurological diseases and blindness were made and administered through the National Institute of Mental Health and its Advisory Council. Fifty research grants were made in the amount of $490,000 for studies in neurophysiology, neuropathology, neuro-anatomy, and specific problems concerning diseases of the eye. In addition, the Research Grants Division, through the National Advisory Health Council, which recommends grants for general medical research, supported projects in these areas in the amount of $350,000.

To support the teaching of neurology—a field which is short of both clinicians and investigators—the National Institute of Mental

Health made $77,881 available for teaching grants. Many of these research and teaching projects will be assumed by the new Institute in 1952. They represent a well-rounded attack on many specific problems such as cerebral palsy, epilepsy, multiple sclerosis, glaucoma, and cataracts, as well as many basic problems about the brain, spinal cord, and neuromuscular systems which are fundamental to an understanding of the causes of these as yet incurable disorders.

The National Institute of Neurological Diseases and Blindness in fiscal year 1952 will have $1,015,000 available for grants in medical research and $51,400 to award for fellowships. These funds will aid promising students at various universities and institutions who are seeking their masters' degrees or doctorates in neurology and ophthalmology, or who are doing postdoctorate work in these fields. Another $36,000 will be available for support of traineeships for qualified physicians, professional personnel, and others seeking specialized training in neurological rehabilitation.

The Nation's Health Resources

The Public Health Service not only contributes to the expansion of the Nation's health resources, both human and material, but renders important advisory and technical assistance in putting those resources to effective use. The perennial need for utilizing health facilities and manpower as efficiently as possible is intensified by the present emergency defense program, since health services must be provided simultaneously for the armed forces and the civilian population.

The defense program affects civilian health services in a variety of ways. The opening of a military training camp, for example, or the expansion of defense industry may produce a critical problem for civilian health facilities and agencies. New installations of the Atomic Energy Commission in South Carolina and Kentucky will result in the construction and population of whole communities, each requiring the full range of health services and facilities. Among them are water supplies, sewerage, hospitals, insect and rodent control, milk and food sanitation, communicable disease control, occupational health, and maternal and child health services. Again, as the Armed Forces expand their training centers, the civilian population in the surrounding areas will increase by at least half the total military strength. Since the armed services are responsible only for health and sanitation within the camp, they depend upon the Public Health Service and State and local agencies to protect both military personnel and civilians in these communities.

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Civilian Health Requirements

Under the authority delegated to him in Defense Production Administration Order No. 1, the Federal Security Administrator placed in the Public Health Service the operation of the Agency's function as claimant before the National Production Authority for all health supplies and equipment, and for construction material for all hospitals, excluding military and veterans' facilities. To carry out these functions, the Surgeon General established a Division of Civilian Health Requirements in the Office of the Surgeon General, effective April 2, 1951. In addition to presenting and justifying claims for civilian health needs before the Defense Production Administration, the National Production Authority, and other defense mobilization agencies involved in determining the allocation of materials and facilities, the Division develops and operates programs for the equitable distribution of such materials as are allocated.

The task immediately confronting the Service during the year was to estimate both short-term and long-range needs for supplies, equipment, and construction to maintain civilian health. Early in 1951, predicted shortages of material began to occur. Pending the institution of a comprehensive materials-control program, the Defense Production Administration set aside specified amounts of steel for the construction of civilian hospitals and health facilities, and delegated to the Public Health Service the responsibility and authority for its allotment and for the issuing of construction permits.

By the end of the fiscal year, the Division of Civilian Health Requirements had recruited within the Service a staff of about 40 persons—including experts in engineering, statistics, medical supplies, public health administration, and hospital planning and construction—and had developed an organization and procedures for carrying out the functions delegated to it. By the close of the year, therefore, the Service was ready to administer its share of the comprehensive Controlled Materials Plan instituted by the Defense Production Administration shortly after July 1, 1951.

Hospital Planning and Construction

Under the provisions of the Hospital Survey and Construction Act, now 5 years old, the 53 States and Territories brought up to date their surveys of hospital needs. They reported that there are slightly more than 1,000,000 acceptable hospital beds available in the Nation. During the year, there was a net increase of almost 142,000 acceptable hospital beds, half of them located in facilities which received Federal assistance through the Hill-Burton program. However, 870,000 addi-

tional beds are needed to provide adequate hospital care for the American people.

A reduction in available funds, together with the steady increase in construction costs, retarded building during the year. Yet notable progress was made, and the effect of the planning and construction started earlier became more apparent. As of June 30, 1950, the Division had approved 1,369 projects representing $344,000,000 in Federal funds, of which only 180 projects were completed and in operation. By June 30, 1951, a year later, 1,580 projects had been approved, representing $424,000,000 in Federal funds, of which 471 were completed and in operation. There were 981 projects under construction, and 128 in the preconstruction stages.

With the majority of Federal funds having gone into the construction of general hospitals heretofore, it is noteworthy that progress was made during 1951 in stimulating greater interest and planning on the part of the States for chronic disease, mental, and tuberculosis facilities. State planning also reflected increased emphasis on providing medical teaching centers, and on the construction of combination hospitals and public health centers. With State planning increasingly stressing a service concept, impetus was given to one of the program's primary objects of insuring better patient care through the coordination of hospital facilities and services.

In view of the fact that Hill-Burton construction represents 33 percent of the dollar value of all hospital construction in the Nation, the Division of Hospital Facilities lent significant assistance during the year to the development of a controlled-materials program. Preliminary study was made of the problems involved in providing adequate facilities for communities in defense areas.

Medical and Hospital Resources

While construction of new hospitals and health centers goes forward, the Public Health Service continues its efforts to assist in dealing with the operating problems of present facilities. The Division of Medical and Hospital Resources develops guide materials for communities and States. It also provides consultation to the technical staff of the Division of Hospital Facilities.

As more Hill-Burton projects have been completed, guide materials have been made available on a larger scale. About 85,000 copies of pamphlets, reprints, and mimeographed items were distributed during fiscal 1951. The 80 titles ranged from "Selecting the Hospital Site" to "Better Patient Care Through Coordination," and included aids on preconstruction planning, staffing, financing, and operation.

At the request of State agencies, the Division provided continued assistance in conducting institutes on hospital operation. These institutes were often used by State groups as patterns for similar local meetings.

The Division of Medical and Hospital Resources also served many groups other than those directly concerned with local hospital projects. Queries came in continuously from foreign countries, Members of Congress, foundations, voluntary agencies in the health field, and various Government departments.

The Problem of Manpower

The most important of all health resources is the Nation's reservoir of trained personnel. There is still a serious shortage of trained professional workers in public health. A count made during the last fiscal year indicated that 326 local health departments were without the services of a full-time health officer. The Nation needs more physicians, dentists, sanitary engineers, nurses, and research scientists, as well as trained technicians to assist them.

STUDIES OF HEALTH MANPOWER

Through its Division of Public Health Methods, the Public Health Service conducts and collaborates in studies that reveal the Nation's health needs and resources. During 1951, the chief problems of this Division were related to the maintenance of adequate health manpower and facilities to protect civilian health and at the same time meet the needs of the armed forces for health personnel. The Office of Defense Mobilization (particularly its Health Resources Committee) has drawn heavily upon the experience and personnel of the Public Health Service in defining and analyzing these problems and in planning ways of dealing with them. Additional work of this type was performed by this and other divisions of the Public Health Service on the staffing of State and local health departments, hospitals, and—in cooperation with the professional associations in medicine, dentistry, nursing, and public health—on the financial and related aspects of education in their respective fields.

The pilot study, begun in 1950, of health manpower requirements in an industrial area, requested and financed by the National Security Resources Board, is continuing. It is being conducted by the University of Pittsburgh Graduate School of Public Health and the Division of Public Health Methods, with the Pennsylvania Medical Society, the Allegheny County Medical Society, and the Hospital Council of Western Pennsylvania actively participating. The first phase of the study delineated the medical service areas in western

Pennsylvania. Further information is being sought on the types of service for which patients go from one locality to another, and of the geographic, economic, and related factors which lead to the development of medical service areas. A companion study of patient loads of dentists in the Pittsburgh area has been made by the Odontological Society of Western Pennsylvania, with the assistance of the Division of Public Health Methods.

HEALTH MANPOWER COMMITTEE

On February 12, 1951, the Surgeon General established a Public Health Service Comittee on Health Manpower, under the chairmanship of the chief of the Division of Public Health Methods. The purposes of the committee are: (1) to serve as a center for information on health manpower available in the Public Health Service and elsewhere; (2) to make that information available to operating programs of the Service; (3) to coordinate Service activities related to studies of manpower; (4) to make or stimulate any special studies deemed desirable; and (5) to make recommendations to the Surgeon General with respect to policies and legislation concerned with health manpower.

The Committee and its staff have given attention to many legislative and administrative developments affecting the Public Health Service and civilian health agencies. Information on manpower studies conducted by various divisions of the Service has been pooled. Available data on resources, requirements, age, sex, income, distribution, and rates of graduation have been summarized for various categories of health personnel, and a comprehensive source book on health manpower statistics is being compiled.

TRAINING HEALTH PERSONNEL

The Public Health Service acts in a number of ways to help meet the shortage of trained health personnel. Its hospitals carry out comprehensive teaching projects, ranging from residencies for physicians to on-the-job instruction for maintenance personnel. Fourteen of the 23 Service hospitals are training doctors under programs approved by the Council on Medical Education and Hospitals of the American Medical Association. Nine are teaching dental interns under programs approved by the American Dental Association. At the end of the fiscal year, 114 medical and 32 dental interns were on duty.

At the Lexington, Ky., and Fort Worth, Tex., hospitals, 118 psychiatric aides received training. The course consisted of formal lectures and demonstrations, followed by supervised experience in the wards.

During the year, the Public Health Service Hospital in Baltimore, Md., graduated five medical record librarians from its approved school

for specialists in this field. This course, the first of its kind in the Federal services, is given in collaboration with the Baltimore Junior College and Johns Hopkins University Hospital.

More than 700 trainees, representing all sections of the Nation and several foreign countries, attended regularly scheduled field training courses conducted at the Communicable Disease Center in Atlanta, Ga., and at regional training centers. An additional 872 public health workers attended specialized training courses conducted by Center personnel in various cities, upon requests from State and local health departments. Forty-one States, the Territories, and a number of foreign countries enrolled laboratory technicians and other personnel in refresher courses offered in Center laboratories.

State health departments have been doing their part to meet the personnel problem by providing training opportunities for public health workers. Approximately 7,000 persons received sponsored training in some field of public health during the past year.

MEDICAL SCHOOL GRANTS AND FINANCES

The report of the Surgeon General's Committee on Medical School Grants and Finances was completed and presented at the joint meeting of the Public Health Service's Advisory Councils in February 1951.

The report has been published in three volumes under the general title, "Medical School Grants and Finances." Part I. "Conclusions and Recommendations," describes the Public Health Service programs that provide funds for research and training in medical schools, affiliated hospitals, universities, and other institutions, and presents the Committee's evaluation of the findings and its recommendations on research grant policies. Part II. "Financial Status and Needs of Medical Schools," gives a detailed analysis of the expenses, income, and endowments of medical schools, and includes the estimates of medical school deans as to the funds needed by their schools for effective operation with current enrollment and with increased enrollment. Part III. "Public Health Service Grants—Their Distribution and Impact on Medical Schools," is an account of the development of the research grants programs and a detailed analysis of the distribution of each type of grant among schools.

Surveys of dental schools and graduate schools of public health paralleling that of medical schools are under way. A companion study of the aims, staffing, facilities, and students of schools of public health has been initiated in cooperation with the Association of Schools of Public Health. The staff of the Division of Public Health Methods detailed to a committee of the National Committee for the Improvement of Nursing Services prepared to report on the charac-

teristics of nursing schools, as measured by standards determined by the National League of Nursing Education.

Dental Resources

The apparently rising prevalence of dental disease and the continuing shift of dentists from civilian practice to the military service have sharply accentuated the need to make better use of existing dental resources and to develop time-saving methods.

During the year the Dental Resources Division completed the field work in connection with a study of the financial status, staffing pattern, and needs of dental schools and dental hygiene schools. The project has been carried out in cooperation with the American Association of Dental Schools and the Council on Dental Education of the American Dental Association, and with the assistance of the Division of Public Health Methods.

Projects to ascertain the value and efficiency of multiple operating chairs and chairside assistants as mechanisms for increasing a dentist's productivity have continued during the year. Preliminary finding's have been very encouraging. A report will be made during the coming fiscal year citing the exact findings of the pilot program at the United States Merchant Marine Academy, Kings Point, N. Y.

Studies concerning a methodology for determining efficiency of specific dental operations resulted in the design and development of a mechanical recorder which will measure the time and effort expended by an operator when performing various dental procedures. Full utilization of this technique is expected to indicate a number of possibilities for extending the services of individual dentists in civilian life, in Government installations, and in the uniformed services.

The Division has developed a "mark sense" statistical card for measuring dental services provided and services needed. The system was put to use in dental clinics throughout the Public Health Service. Data now being analyzed by this new recording method indicate that it is simpler, less expensive, and more complete than previous methods.

During the fiscal year, studies to improve the classification and diagnosis of dentofacial deformities were undertaken and a simple anthropometric instrument was designed for this purpose.

Nursing Resources

The Nation's nurse shortage climbed to 65,000 during the year, but the Division of Nursing Resources, in consultation with national

professional organizations, found that steady, although slow, progress was being made toward conservation of nursepower and better utilization of the existing nurse supply. The Division's program of surveying nursing resources and studying nurse functions by request of States and individual hospitals has been an important factor in this progress.

SURVEY ACCOMPLISHMENTS

Since 1946, 27 States have requested the assistance of the Division's staff in conducting surveys. Iowa, Nebraska, Oklahoma, West Virginia, and Hawaii were surveyed in the past year.

Stepped-up student recruitment is only one answer to the question of increasing the nurse population. Surveys of nursing resources have revealed that the nursing education system needs tightening to reduce the high percentage of student withdrawals before graduation, and to offer greater opportunities for graduate work qualifying instructors for schools of nursing and candidates for administrative and other leadership posts. They have also shown that ways must be found to attract inactive nurses back into the profession and to prepare larger numbers of practical nurses to assume the nonprofessional aspects of care in hospitals and homes.

During the past year, Arizona launched a course in public health nursing in which 80 public health nurses are currently enrolled—the first college-accredited program for graduate nurses offered by this State. In Florida, a university school of nursing has been established at the State university, a long-needed stimulus to recruitment, and a new practical nurse school has been authorized. In Massachusetts, following recommendations by the Division, three small schools of nursing combined to save faculty and consolidate teaching facilities. The first year's admissions were twice as high as the number of students the three schools together were able to recruit before consolidation.

Mississippi doubled its student enrollment, cut the number of its schools in half, and improved its recruitment program by improving the schools themselves through advanced preparation of faculty and coordination of teaching programs. Over 300 nurses have taken extension courses to prepare themselves better for their present jobs. The State has been able to open 21 new hospitals without delays due to lack of nursing staffs and, for the first time, practical-nurse programs have been developed which are now producing trained women to assist in patient care on the nonprofessional level.

South Carolina, surveyed in 1950, formerly offered clinical experience in psychiatric, tuberculosis, and communicable disease nursing to student nurses in only a fraction of its schools. Since the survey,

60 percent of schools offer instruction in psychiatric nursing, 100 percent offer communicable disease nursing, and 46 percent provide instruction in tuberculosis care. For the first time, graduate work is being offered in ward management and public health nursing through the State University Extension Division, and six undergraduate schools are providing experience in public health nursing.

In West Virginia, 61 percent of inactive nurses said they would be available for full- or part-time duty. In Oklahoma, action is under way to survey personnel policies and practices.

All States which have been surveyed have active citizens' committees which are working with the professional nursing groups in carrying forward survey recommendations.

ECONOMIC USE OF NURSEPOWER

The need to use nurse time efficiently and to establish appropriate relationships between professional and nonprofessional nursing functions prompted hospitals to ask the Division of Nursing Resources to devise a method of studying nursing service activities on various levels.

From a study requested by a New England hospital and university in 1950, a method of studying head nurse time in hospitals has been developed and described in a manual, "Head Nurse Power and How To Use It," which will undergo extensive field trials. The study showed that at least one-third of the head nurse's time was devoted to activities which could have been performed by clerical or other personnel—a costly waste of management skills and professional knowledge.

Engineering Resources

The growing importance of environmental health factors makes the sanitary engineering resources of the Nation a significant element in the public health picture. The Public Health Service's Division of Engineering Resources has as its main purpose the evaluation of activities and the delineation of needs in the environmental health field. The Division completed three statistical studies during the year: (1) A study to determine the number of graduates from schools of sanitary engineering; (2) a survey to gain more precise knowledge about persons who completed undergraduate training in sanitary engineering but who eventually left the profession; and (3) an analysis of present and anticipated job vacancies among environmental health personnel.

During the year, the Division completed—in cooperation with other divisions of the Service—a resource book entitled "Environment and Health," which discusses problems and needs in this field, and shows

how Federal, State, and local health agencies work toward building a more healthful environment.

Members of the Division participated in civil defense activities by assisting other divisions and other Federal agencies on special defense-related projects; by establishing a liaison office at Camp Detrick, Md.; and by serving on task forces and Public Health Service committees concerned with the problems of manpower, postdisaster relief, and civil defense.

HYGIENE OF HOUSING

Interest in the health aspects of housing grew throughout the year. Seven State health departments and more than 20 local health units now have active programs to enforce minimum health standards for the maintenance, use, and occupancy of substandard housing. A study to evaluate the effects that health department activities have on the improvement of housing conditions was begun during the year by the Public Health Service in cooperation with a State and a local health department. A similar cooperative research project, with a local voluntary organization participating, seeks to determine how local health agencies can help to enforce housing laws.

RADIOLOGICAL HEALTH

In former years, radiation did not pose a serious threat to public health. Today, however, sources of ionizing radiation are more widely used. Each atomic reactor produces the radioactive equivalent of tons of radium. Radioactive substances are used in increasing numbers of hospitals, industries, and research establishments. X-ray machines may be found in a variety of settings, from shoe stores and foundries to physicians' offices. Potentially, ionizing radiation may affect the environment and thus the health of many communities.

The Division of Engineering Resources took steps to meet this hazard by developing systematic training programs. In cooperation with the Environmental Health Center, the Division conducted 10 training courses of from 1 to 3 weeks in length in radiological health and radiation instrumentation. It also assisted in 16 training courses given by Federal, State, and local civil defense authorities. At the request of the Federal Civil Defense Administration, five 1-week seminars in the nursing aspects of atomic warfare were conducted by a team of Public Health Service radiation experts in five different cities.

In addition to these training activities, the Division offered consultative services to State and local health authorities on radiation problems. In cooperation with the Divisions of Sanitation, Industrial Hygiene, and Hospital Facilities, it also started a survey of X-ray

departments in Public Health Service hospitals to measure radiological health hazards.

The Nation's Health Services

In meeting the Nation's growing demands for health services, the Public Health Service has a multiple responsibility. Its trained personnel and its health facilities bring direct medical and hospital care to numerous categories of citizens designated by Congress. Its Division of Foreign Quarantine guards the Nation against the entry of epidemic disease. Even more far reaching is its contribution to State and local health activities through a broad variety of catalytic functions. Although the front line in the battle to improve the health of the American people runs through thousands of local communities, the Public Health Service provides a center of information and cooperation to make that fight more effective.

The Bureau of State Services is the focal point of a sweeping Federal-State cooperative health program. Through this Bureau, the Service develops and investigates new techniques, evaluates methods and procedures, and conducts demonstrations in public health practice, making its findings available to local health agencies. It conducts training programs for health personnel. It offers reference, laboratory, diagnostic, and consultative services. It helps prevent the spread of disease through the application of interstate quarantine regulations, and furnishes special aid in the event of epidemics and disasters. It develops Nation-wide standards and guides in various professional and technical fields, such as public health nursing, health education, and sanitary engineering. And, finally, it administers the system of financial grants-in-aid which enable health agencies to strengthen their general health structure and to focus special attention on the diseases and conditions which constitute problems of grave national concern.

Most of these technical and consultative services reach State and local health departments through the 10 regional medical directors of the Public Health Service and their staffs. The regional directors are also responsible for interstate quarantine work and for the inspection of Public Health Service hospitals and quarantine stations. At semiannual meetings in Washington, D. C., the regional medical directors discuss mutual problems and work out common patterns of public health practice.

The past year saw a strengthening of that partnership of Federal, State, and local agencies which is the key to the Nation's steady gains in health.

Grants to the States

Federal appropriations to the Public Health Service for grants to States, excluding grants for hospital construction, totaled slightly more than $40,000,000 in 1951. This represented a reduction of approximately 12 percent from the 1950 figure. State and local funds available for the operation of health departments, exclusive of sums for hospital care, reached an estimated $200,000,000 in 1951, an increase of 9.3 percent over the figure for the previous year. While this increase in State and local appropriations produced a net gain in the total amount of money available for public health, the increased cost of health services prevented the expansion of many programs to meet emergency needs.

Grant-in-aid payments made by the Public Health Service to the States in 1951 were as follows:

General health	$13,540,085
Venereal disease (including rapid treatment and special projects)	9,882,902
Tuberculosis	6,350,000
Mental health	3,074,429
Cancer control	3,026,908
Heart disease	1,359,385
Industrial waste studies	866,853
Hospital survey and planning	107,883
Alaska grant	694,000

In addition, $142,743,507 of Federal funds was obligated for the construction of hospitals under the Hill-Burton Act. Payments totaling $108,096,418 were made during 1951 for hospital construction. Table 3 presents payments to each State.

STATE PROGRAMS

State health agencies continued their development of programs for the prevention and control of the chronic diseases. Cancer-control programs received increased attention generally and were expanded in many areas. Programs for the control of heart disease, many of which were initiated in 1950, developed improved techniques and more clearly defined objectives. Some State health departments explored such other chronic disease problems as diabetes, arthritis, and rheumatism.

Many areas of the country still lack full-time local health services. As of June 1951, about 1,300 organized health units provided full-time local health services to some 1,500 of the 3,070 counties in the United States. In addition, there were 60 State health districts which furnished advisory and supervisory services to more than 550 counties.

One of the important tasks of the Public Health Service is to help State and local agencies improve the caliber of health administration.

The Division of State Grants provides consultative services to this end, and conducts a variety of studies in the organization and management of health programs. During the year, the Division completed the field work and analysis of data for the extensive decennial study of the distribution and organization of health services in the structure of State governments. For the fourth consecutive year, the Division collected and published information on salaries paid State and local health workers. These publications are of value to public health administrators in determining salary levels and planning recruitment program.

Vital Statistics in the Service of Health

The National Office of Vital Statistics compiles, analyzes, and distributes a numerical account of the Nation's births, deaths, stillbirths, marriages, divorces, and diseases. Through cooperative planning, consultation, and special projects, the National Office also assists the State agencies which have the primary responsibility for collecting vital statistics within their own areas.

During the past year this cooperative activity was continued and expanded. For example, a filmstrip was developed to show the proper method for medical certification of causes of death. Health departments throughout the Nation are using the filmstrip in educational work with medical practitioners. Meanwhile, training of State and local cause-of-death coders in the use of new classification procedures was continued.

A records program to ascertain causes of fatal accidents in the home was presented to State health departments. Twelve States are utilizing the Public Health Service report form to collect information as to the circumstances and contributory causes of domestic accidents, which are outranked only by motor vehicle accidents in occasioning violent death. With the data gained from these reports, local, State, and national health groups can plan specific accident prevention programs.

Major phases of a Nation-wide test of birth registration were carried out during the year to obtain measures of completeness of birth registration. Records filed for infants born during the first 3 months of 1950 were matched against infant cards filled out by Census Bureau enumerators for children born during the period and alive on April 1, 1950. The results show that registration completeness has improved markedly throughout the country since 1940, when the last such test was conducted.

Work continued on a long-range program to improve communicable diseases statistical reporting. Reports of epidemic outbreaks are of special significance when they are caused by un-

usual disease, investigated through new techniques, or concern national defense, especially against biological warfare. In January 1951, information concerning epidemic outbreaks of communicable diseases pertinent to civilian defense was included in current publications.

COOPERATIVE PROGRAMS

In April 1951, the Communicable Disease Center, in cooperation with the National Office of Vital Statistics, sponsored a conference in Atlanta, Ga., to discuss changes in morbidity reporting procedures. Consultants from Federal, State, and other agencies participated in the discussions. A decision was reached as to a revised list of diseases which the States will report to the Public Health Service in weekly and annual summaries, beginning January 1, 1952.

Cooperative studies conducted by the National Office of Vital Statistics, the Office of Indian Affairs, and the States of Arizona and New Mexico have revealed vast underregistration of Indian births and deaths on the Navajo reservation. As a result of these studies, the Navajo local registration system has been reorganized and selected traders and interpreters have been appointed as local registrars for vital statistics on the Reservation.

INTERNATIONAL ACTIVITIES

In the international field, the program for the development and improvement of vital statistics was continued under the Act for International Development (point IV), Public Law 535. Technical advisory services to other governments, training of foreign nationals, exchange of technical information, and services to foreign visitors comprise some of the program activities.

One of the highlights of the year was the Inter-American Seminar on Biostatistics, held in Santiago, Chile, September 16 to December 23, 1950. Instructors, training grants, and technical materials were supplied by the Division. Consultants from the National Office of Vital Statistics had the responsibility for carrying out a health survey and test of completeness of registration in the Quinta Normal Health Center. The participants at the seminar were given an opportunity to engage in all phases of the survey and birth registration completeness test and thus obtain practical experience in the techniques of gathering and interpreting vital statistics data.

Public Health Nursing

The number of nurses employed by public health agencies rose in 1951 to 25,461, compared with 15,997 20 years earlier. Even more encouraging is the increase in the number of nurses with a full year of

university preparation. More than 35 percent of nurses in public health now have this special qualification, compared with 7 percent in 1931. Despite these gains, nearly twice the existing number of nurses must be employed if present public health nursing needs are to be met.

Through its Division of Public Health Nursing, the Public Health Service supplies leadership in the development and improvement of public health nursing services on local, State, national, and international levels. During the year, the staff of the Public Health Nursing Division participated actively in the program of such organizations as the American Public Health Association, the American Nurses' Association, the National Organization for Public Health Nursing, the National Health Council, the International Council of Nurses, and the Expert Committee on Health Education for the World Health Organization. The biennial work conference of State nursing directors was held in March 1951, to plan nursing needs in the defense program. It was attended by the regional and special nursing consultants of the Public Health Service and the Children's Bureau.

There were 144 public health nurses on duty in the Public Health Service on June 30, 1951, as compared with 142 a year earlier. While most of these were assigned to operating programs, a number gave their attention to in-service education and staff development. Fourteen nurses were assigned to States for experience in supervisory work, 3 were detailed as acting directors of State nursing services for administrative experience, and 2 were sent to universities for advanced study.

Environmental Health Services

New problems in environmental sanitation were raised during the year and familiar problems intensified by the defense program and the accompanying shifts of large population groups. For example, the Public Health Service's Division of Sanitation added to its activities consultative services relating to biological warfare and atomic energy. The Division assisted in training courses for military personnel in food handling and sanitation. Technical assistance was given to the Federal Civil Defense Administration in formulating its plans and programs with respect to certain aspects of food supply.

MILK AND FOOD SANITATION

Over 325 investigations of milk and food service equipment were conducted during the year, each in response to a specific request. Fifty-four community-wide milk sanitation surveys were completed. Fifty-eight training schools were conducted for milk- and food-handling personnel, and 38 seminars were held for State and local agencies and private industry. Inspections were made of food supplies and

food service facilities in Federal parks, prisons, and hospitals. Interagency and government-industry conferences for the development of standards in dairy and food-service equipment were continued.

The Division of Sanitation conducted four field study projects covering: (1) time and temperature conditions required to kill or devitalize *Coxiella burnetii*, the causative agent of Q fever; (2) control problems in the manufacture of concentrated fluid milks; (3) investigation of milk evaporating and drying equipment and milk powder plant operations; and (4) determination of proper control measures and adequate methods of cleaning milk plant pipelines.

Shellfish Sanitation

Supervision, control, and evaluation of the shellfish industry continued. An important research project was initiated at the Shellfish Sanitation Laboratory at Woods Hole, Mass., to provide data concerning the bacteriology of shellfish after their removal from growing waters and during marketing. As required by interstate quarantine regulations, lists of certified shellfish shippers were compiled and sent to health and food control officials. Negotiations were begun with a number of foreign countries over the problems of shellfish importation.

EXAMINATION OF INTERSTATE CARRIERS

In protecting the health of passengers and employees on trains, planes, busses, and vessels, the Division of Sanitation has encouraged the voluntary adoption of recommended practices, using punitive measures only as a last resort. These methods have met with enthusiastic response from the country's transportation systems, resulting in a higher standard of sanitation than might otherwise have been achieved. Interstate carrier examiners were able to report excellent progress in preventing the transmission of food- and water-borne diseases across State borders. They were also able to assure good health conditions on conveyances operating in interstate traffic and aboard American vessels engaged in foreign trade.

Protective measures involved inspections of 2,900 railroad dining cars, 2,200 American ships, 3,000 watering points in the United States, and 1,200 public water supplies. Lists of watering points and of the sources of milk and frozen desserts for consumption on carriers were compiled and classified periodically. Plans for construction of ships, airplanes, trains, and new watering point facilities were also reviewed.

TECHNICAL SERVICES

The Public Health Service furnished technical advice on public water supply sanitation during the year to States, municipalities, and

regions, and to other Federal agencies. Investigations were made into the applicability of the new membrane filter; a film was produced on sanitary drilled wells; and uniform standards were developed for waterworks. A staff member of the Division of Sanitation served on the President's Water Resources Policy Commission.

New Knowledge in Environmental Health

The Environmental Health Center, with its base laboratories in Cincinnati, Ohio, continued its programs to find answers to these as well as to other perplexing environmental health problems. Through research in its own laboratories, through field surveys, and through consultation and training, the center works with other parts of the Public Health Service and with State health agencies in helping build a healthful environment. During the year, foundations were laid for a new laboratory building in Cincinnati, where physicians, engineers, physicists, chemists, biologists, and other scientists will pool their skills in the interest of a coordinated approach toward research in environmental health.

LABORATORY RESEARCH

During the year, the center completed preliminary studies on a new and significant method of detecting bacteria in water through the use of a membrane filter. This technique is not only more sensitive than the standard water bacteriology procedures in use during the past 35 years, but is also superior in terms of cost, time, labor, and equipment. Work is now being done to develop and perfect the practical applications of the filter.

Other important studies are under way on the occurrence of viruses in water and on methods of eliminating them. Investigations are also being conducted to solve the knotty problem of tracing the sources of unpleasant tastes and odors in public water supplies. As a result of these studies, new microchemical techniques have been developed which enable investigators to detect tiny amounts of noxious substances, as little as a few parts per billion, in water supplies. Complex organic mixtures are being successfully broken down into specific compounds and identified through the use of infrared spectrophotometry. These studies have provided new leads to the detection of waste discharges and have uncovered important clues to problems which have baffled the operators of waterworks for many years.

As a result of intensive studies in the bio-assay of the toxicity of industrial wastes to fish life, standardized procedures have been established which will permit an industry to determine, in advance, the effects of its wastes on the aquatic life in any specific body of

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water. Other biological studies were made to determine the types and quantities of aquatic life which are found in clean and polluted waters. These findings will permit water pollution control officials to determine rapidly and with limited equipment the history and present state of pollution in a specific stream.

Bacteriologists in milk and food sanitation work developed a new stain for the microscopic examination of milk whereby more bacteria can be recovered than is possible with the stains currently in use. Slight modifications of this stain have also been found successful in detecting the causative organism of syphilis.

FIELD INVESTIGATIONS

Several field studies have been launched to determine the current quality of water, and the effects of radioactive and other wastes on the normal uses of water in areas where atomic plants are located. Undertaken in cooperation with the Atomic Energy Commission, studies are now under way on the Columbia River in Washington and the Savannah River in South Carolina.

Engineering and laboratory studies were completed during the year to determine what effects the construction and operation of the Alatoona Reservoir had on the quality of the water in the Etowah River. A picture of the water quality and of the extent of pollution was obtained both before and after the construction of the reservoir. This "before" and "after" picture can serve as a practical method of estimating the effects of impoundments in other areas on water quality. At the request of and in cooperation with the State health departments of Missouri and Illinois and the Bi-State Planning and Development Agency, the Center's specialists are participating in an investigation of pollution in the St. Louis area of the Mississippi River. The survey was undertaken following complaints by fishermen about the unpalatable fish caught in this area. A comprehensive report was published on the investigation of water pollution in the South Platte River, including recommendation for abatement.

Industrial waste studies were intensified at the Center. An industrial waste guide on the beet sugar industry was published, including characteristics of the wastes and methods of treating them. Field investigations are going forward in other industries, and similar guides will be published when the studies are completed.

TRAINING

The Center devoted considerable attention to training in radiological health for State and local health workers. A staff of specialists in the medical, chemical, physical, and engineering aspects of radiation conducted six courses over a total of 12 weeks in basic radiological health training and instrumentation. These courses were attended by 133

public health workers from 38 States, the District of Columbia, Panama, the Canal Zone, and Canada. In addition, special field training courses were conducted for public health nurses, engineers, physicians, waterworks operators, food and drug inspectors, and other health personnel in 17 cities; some 3,400 people attended these courses.

The Center also offered special advanced training in water pollution control, sanitary bacteriology, sanitary chemistry, and emergency measures to combat biological, chemical, and radiological contamination of water, food, and air. Six formal courses of 1 to 3 weeks' duration were given for 94 professional public health workers from 34 States, the District of Columbia, Puerto Rico, and Canada. The Center also assisted State health departments conduct short field training courses in 6 cities for 710 State and local public health personnel. Special short courses were held for 27 foreign sanitary engineers and chemists who were studying water and sewerage practice in this country.

Water Pollution Control

Pollution of the Nation's streams is a threat to the health and economic strength of the country, serious at any time, but particularly critical during a period of national emergency.

The basic facts on water pollution for the country as a whole, to the extent that those facts are available, have been assembled, and will serve as the foundation for the comprehensive abatement programs whose development the Congress directed. A summary of these facts,[3] jointly compiled by the Federal Government and the States, reveals a total of more than 22,000 individual sources of pollution in the United States today, divided about equally between municipal sewer systems (11,800) and industrial waste outlets (10,400). From the facts now known, it appears that there is a present need for approximately 10,000 new waste treatment plants, or additions to present inadequate plants—6,600 for municipalities and 3,500 for industries. This does not represent the actual total need, however, since information is not available as to the adequacy of present treatment for 1,600 municipal sources of pollution and for 5,500 industrial sources.

To make the assembled data immediately available to the Nation the information is being presented in 15 summary-type reports covering the United States by major drainage basins. Six of the fifteen basin reports are already in print, and it is anticipated that the remainder will be completed by the end of 1951. These summary reports present information about the ways our water resources are being used, the pollution going into them and the resulting damages,

[3] Public Health Service Publication No. 64, Water Pollution in the United States.

the benefits which may result from pollution prevention and abatement, pollution prevention measures now in effect, and those required. Data are given for each of the several subbasins of the major basin, and a tabulation of water-pollution control projects now known to be needed is included.

The Public Health Service, representing the Federal Security Agency, is now officially a member of the Federal Inter-Agency River Basin Committee, which was established by inter-agency agreement in 1943, to provide a mechanism for continuing the coordination of resource development programs which had previously been accomplished through the National Resources Planning Board.

STATE LEGISLATION

Activity in the field of State water-pollution-control legislation has been increasingly evident since the enactment of the Federal law. Nearly all States have some form of water pollution control law. The provisions of those laws vary widely and difficulty has been experienced in coordinating their operation when interstate waters are involved. To meet this difficulty, and in compliance with the instruction in the Federal act, an effort was made to bring together in one document the best provisions of existing State laws, together with such added provisions as were deemed desirable to permit operation of an effective water pollution control program for the Nation. From this draft, a suggested State law was developed, which the Council of State Governments has endorsed and adopted as part of its 1951 legislative program.

INDUSTRIAL WASTES

The National Technical Task Committee on Industrial Wastes, established in May 1950, on invitation of the Surgeon General, has been increased to cover 36 major industries of the country concerned with water pollution and the improvement of the Nation's water resources. Task groups have been established and substantial progress has been made both in assembling technical information covering existing practices in reducing waste and in inventorying research (in progress and pending) on the development of better methods of treating wastes. The last meeting of the Technical Task Committee was held in Cincinnati at the Environmental Health Center early this year.

INTERNATIONAL COOPERATION

Assistance to the International Joint Commission (United States and Canada) has continued through participation in the work of the Boards of Technical Advisers. The report of the Commission on the

investigation of boundary water pollution conditions along the St. Mary's River, the Detroit and St. Clair Rivers and Lake St. Clair, and the Niagara River has been completed and will be issued in October 1951.

Better Health on the Job

The field of occupational health presents a far greater challenge than has heretofore been realized. It is becoming increasingly obvious that occupational health must encompass not only the worker's environment while actually on the job but also his home, his family, and his community, as they affect his health.

The general expansion of industry and its movement into previously nonindustrialized areas has intensified existing problems in occupational health and created new hazards. To meet these new demands, the Public Health Service's Division of Industrial Hygiene, in cooperation with State and local health agencies and with labor and management, has pursued a broad program including field studies in industries, the development of new instruments to detect occupational hazards, studies of absenteeism, and evaluation of the use of nursing service in industry.

STUDIES OF INDUSTRIAL HAZARDS

Uranium

A major activity was the study of health hazards associated with the mining and milling of uranium ore. Work completed in the Colorado Plateau in the past year now substantiates the thesis that miners there are exposed to silica-containing dust and to radiation. Participating with the Division and the Colorado State Department of Public Health are the Atomic Energy Commission, the Los Alamos Scientific Laboratory, the Naval Radiological Defense Laboratory, the National Bureau of Standards, the Universities of Rochester, Colorado, and Utah, and the New Mexico, Arizona, and Utah departments of health.

To date, physical examinations, including X-ray and clinical tests, have been performed on approximately 800 miners and millers. Industrial hygiene physicians will conduct periodic medical studies in the next 5 years to determine health effects. Data for the evaluation of the degree of exposure to hazardous materials were gathered in 4 mills and approximately 50 mines.

The Division is assisting the companies in establishing a radiation and dust control program. It is hoped that, because of early and precautionary measures which many companies have inaugurated, cases of serious health damage will not occur.

Chromate

At the request of the chromate-producing industry, a study was conducted in 7 plants employing 1,000 workers. Evidences of lung cancer, as well as findings of perforated nasal septa and chrome ulcers, have confirmed suspicions of hazards in this industry. At the recommendation of the Division, certain changes in production processes were made to decrease harmful exposures. These recommendations and detailed clinical and environmental findings will be presented in a report now in preparation.

FERROUS METALS

The findings of a 12-month survey of the exposures of ferrous foundry workers to silicosis and other hazards was published. The report revealed that dust conditions in the 18 foundries studied, as compared with those found by industrial hygiene agencies in previous surveys of the foundry industry, have improved in the past 10 to 20 years. Evidences of observed lung disease were considered to be due largely to the high dust concentrations that existed previously in the foundries. Room for improvement was noted, however, and appropriate recommendations were made for the control of silicosis and other health hazards.

Air Pollution

The Detroit, Michigan-Windsor, Ontario air pollution study, undertaken at the request of the International Joint Commission, proceeded. Both the Canadian and the United States Governments are participating in the study. The American phase is conducted by the Division of Industrial Hygiene. The 5-year study should yield valuable information pertinent to other air pollution problems.

The town of Poza Rica, Mexico, was the site of another air pollution study in the past year. Deadly hydrogen sulfide gas escaping from a refinery resulted in the hospitalization of 315 persons, and 22 deaths. Division personnel and representatives of the United States Bureau of Mines investigated the incident and made recommendations to prevent a recurrence. Assistance with preliminary surveys and epidemiological studies of air pollution was also given in Cumberland, Md., and Salt Lake City, Utah.

LABORATORY ACTIVITIES

Considerable work was done to develop more precise and sensitive methods of evaluating trace concentrations of toxic metals in the blood and urine. A refinement was also made in the electrostatic precipitator, an instrument useful in air pollution work. The development of a new high-voltage power source for the electrostatic precipitator

has resulted in a more efficient, more reliable, lighter, and less expensive unit. An instrument known as the spiral sampler, also developed during the past year by members of the Division staff, gives promise of being a useful tool for studies of particulate matter, since it collects dust samples in such a way that the particles are automatically separated according to size. In addition to dust tests, extensive experiments have been undertaken to determine the ability of the spiral sampler to remove bacteria from the air and to adapt it for purposes of sampling airborne organisms.

Toxicological research continued on a number of substances, including the new insecticide, parathion, which has been responsible for a number of accidental poisonings. Respiratory diseases resulting from the inhalation of herbaceous dusts were also studied. Laboratory research continued on industrial anthrax from the processing of imported carpet wool. An epidemiological study of this disease was completed, control recommendations were made, and a report was published.

SPECIAL STUDIES

A pilot study of selected manufacturing industries was initiated to determine the amount of nursing service utilized in the various phases of an occupational health program. The data was expected to promote fuller use of nursing service in industry, based upon employee health needs.

A pilot study to develop a Nation-wide occupational disease reporting system is in full swing. Some 7,000 individual reports of occupational diseases have been received from the 10 participating State divisions of industrial hygiene, and a good start has been made in the classification of these reports. Upon completion of the study in December 1951, a bulletin on reporting practices will be prepared. The study should result in recommendations for uniform, adequate reporting on occupational diseases.

CONSULTATION AND PUBLICATION

Consultation on a wide range of medical, dental, nursing, statistical, analytical, and engineering problems was provided upon request to a large number of States, municipalities, and official agencies. Assistance was given the St. Louis County Department of Health in organizing and conducting a preliminary survey of the industrial health problem in its area as a basis for reestablishing a permanent industrial health program in the county. As part of the Division's educational program, an industrial nursing consultant was assigned for the second full year to Yale University to develop occupational

health nursing curricula. Industrial hygiene courses have also been conducted for the medical and engineering students at the University of Utah.

To meet increasing demands from management, labor, and professional groups for information on in-plant medical and prepayment programs, a comprehensive sourcebook covering significant aspects of plant medical services and related health programs, was compiled and published. To make health services available to workers in small plants, an extensive annotated bibliography on "Small Plant Health Programs" was also published.

The report of sickness-absenteeism in industry (covering approximately 178,000 persons) showed higher absences (due to sickness and nonindustrial injuries) in 1950 than in the preceding years. There were 116.8 per 1,000 men, the highest annual rate since 1945, when the rate was 147.4. The frequency of disability among the women (258.4 absences per 1,000) was the highest of the annual rates for the 10-year period 1941–50, exceeding the 1949 rate of 254.5 by 2 percent. These rates of sickness-absenteeism characteristically reflect a period of high production.

Progress Against Venereal Disease

Less syphilis was reported in 1951 than in any year since 1929, and less gonorrhea than in any year since 1942. Nevertheless, nearly 200,000 cases of syphilis and more than 270,000 cases of gonorrhea were reported among civilians in the United States. The expansion of the armed forces and of defense industries, meanwhile, poses new problems of control. During the year, the Public Health Service, along with State health departments, assigned case-finding specialists upon request to military posts.

Among the difficult problems in venereal disease control are the following:

1. The 3,000,000 positive serologies which are probably present in the United States.
2. The biology of the spirochete and of immunization in syphilis.
3. The lack of specificity of laboratory procedures.
4. The care and prevention of late symptomatic syphilis.
5. The application of technical knowledge and operational skills in case finding to all of the areas needing assistance.
6. The final evaluation of penicillin therapy.
7. The failure of gonorrhea incidence and prevalence to respond satisfactorily to any control procedures yet applied.

Despite these problems the records of clinics and rapid treatment centers reflect the vigor with which health departments are proceeding against venereal disease. Diagnostic observations completed in

clinics, numbering over 2.4 million, resulted in the admission for treatment of more than 388,000 individuals with venereal disease. About 450,000 investigations were made in 1951 to find cases of venereal disease and bring them to treatment. Admissions to venereal disease in-patient centers numbered 110,000.

The Public Health Service, through the Division of Venereal Disease, assisted health departments in their case-finding activities and in other aspects of their control programs. The three major steps in case finding are public education, mass testing, and contact tracing. Fifty-eight case-finding projects in 34 States received aid in the form of funds, services, and supplies. The Division assigned a team of specialists to the Virgin Islands which, in cooperation with the Island's health department, conducted a venereal disease survey.

A recent study conducted by the Division demonstrated that performance of serologic tests over the Nation is fairly adequate. Results of this survey indicated a universal willingness not only to adopt improved tests as quickly as they are developed but also to strive for improved performance.

RESEARCH IN VENEREAL DISEASE

Research in venereal disease went ahead in the three research centers of the Division of Venereal Disease, as well as in nongovernment institutions. Research centers operated by the Division are: The Venereal Disease Research Laboratory, Chamblee, Ga.; the United States Public Health Service Medical Center, Hot Springs, Ark.; and the Venereal Disease Experimental Laboratory, Chapel Hill, N. C. Among the perplexing and vital problems under study in the Division's broad research program are (1) immunity in syphilis; (2) the artificial cultivation of the organism which causes syphilis, *Treponema pallidum;* and (3) certain variations in the response of the organism, therapy, and the host. Under investigation was one procedure—the treponemal immobilization test—which may strengthen the laboratory diagnosis of syphilis.

One of the basic functions of the Venereal Disease Research Laboratory at Chamblee, Ga., is the maintenance of standards of serologic work in State and local laboratories. It supplies antigens to these laboratories and evaluates their serologic procedures. During the year, it also provided serologic analysis for approximately 14,000 blood specimens obtained in the Virgin Islands, and 228,000 specimens tested in the Atlanta health screening program.

PROSPECTS FOR CONTROL

In viewing the picture of venereal disease control at the end of the year, two principal lessons may be discerned for the future. First, the methods used in control are sound, but persistence is required in

their application. From the public health point of view, there is no known way to control venereal disease except to find it early and, through treatment of individual cases, to cut off its killing and crippling potential. Second, while knowledge of the treatment, clinical course, and fundamental biology of venereal disease is expanding yearly, there are still great gaps in our knowledge, particularly in syphilis. To help fill in these gaps, study and research must continue to go forward.

Chronic Diseases and Tuberculosis

The Division of Chronic Disease and Tuberculosis was established midway in the fiscal year by merging the Division of Chronic Disease and the Division of Tuberculosis. The action was taken to combine the many characteristics and objectives common to the control programs of both divisions. To utilize the comparable skills found in both programs economically and flexibly, a threefold division of labor was assigned: scientific research, program development, and State aid. Tuberculosis control and the chronic disease programs alike should benefit from the techniques already developed and the experience gained separately in the two activities.

TUBERCULOSIS CONTROL

Tuberculosis, about which medical knowledge is great, was emphasized by the Division during the year. The latest reported death rate (estimated, 1950) was 22.6 per 100,000 population. There were, however, more than 120,000 newly reported tuberculosis cases in the United States in 1950, or more than 3½ new cases per death. This is the highest ratio of new cases per death ever recorded. Mass X-ray survey reports and health department case record reports taken together suggest that there are in the United States a total of approximately 1½ million tuberculosis cases. The picture thus presented statistically prohibits any slackening of efforts to improve and strengthen the existing control programs.

Through the Division's mass case-finding program, over 1½ million people were X-rayed in Arizona, California, and New Mexico, and in special programs in Minneapolis and on Indian reservations. Nurses, medical social workers, health educators, and statisticians from the Division assisted communities in planning their mass X-ray surveys, in anticipating an increased need for services, and in organizing local resources to provide essential medical and social services for patients in whom tuberculosis and other diseases were found.

Further support was given to general tuberculosis control activities in the States through grants-in-aid totaling $6,350,000.

During the year the Division continued to participate in research on the use and limitation of streptomycin and other antibiotics for the treatment of tuberculosis. Several of the principal studies of antibiotics have already been completed and the results published. Others are still being analyzed or are due to be evaluated soon.

Some major programs designed to aid in the evaluation of BCG vaccination were completed during the year. On others, follow-up activities were continued. Long-term studies involve the follow-up of vaccinated and unvaccinated populations to determine the effect of BCG vaccination upon the development of tuberculosis. Shorter projects deal with such matters as variations in the degree of allergy to vaccines from American and European producers and among various methods of vaccination; investigation of different testing techniques; and development of vaccination lesions.

Progress was made in developing a technique for producing high quality facsimiles of X-ray films—which are important as training materials for X-ray interpretation courses—and in further standardization of photofluorographic and roentgenographic equipment.

CHRONIC DISEASES

Major efforts were also made toward increasing knowledge and control of heart disease and diabetes, through laboratory and field research and the strengthening of professional services. For the fiscal year, $1,700,000 in grants-in-aid was available for heart disease. Of this sum, $1,359,000 was paid to the States and Territories. Professional education was emphasized, and efforts were made to stimulate rheumatic fever case finding and prophylaxis. Cooperative heart disease demonstration programs were operated at Newton, Mass., and Charleston, S. C. Almost 3,000 people were screened for heart disease at Newton this year. The anticoagulant program now being carried on nationally was developed here, and medical technologists from Massachusetts and Florida were trained in the accepted methods of prothrombin time determination. In the Charleston program a great amount of work was done in the detection, referral, and prophylaxis of persons with rheumatic fever.

Weight reduction was promoted by nutritionists working in both demonstration programs. Several institutes on nursing education were held and the Division's nurses gave consultation services to several State health departments on heart disease control problems.

Consultative service by physicians, nurses, and nutritionists on diabetes control was given in 20 States. The Milwaukee, Wis., detection program was completed. The Jacksonville, Fla., program was transferred to the State health department. In Massachusetts, a Study and Training Center was opened in cooperation with the Boston City Hos-

pital. The Oxford project was reopened to study the effect of the work done 4 years ago. An intensive evaluation of the more commonly used blood sugar and urine sugar tests was begun.

New approaches to the problems of chronic illness were explored by the Division during the year. Cooperative multiple-screening projects were operated in Richmond and Alexandria, Va.; Atlanta, Ga.; and Indianapolis, Ind.

In the home care demonstration project at Gallinger Hospital, Washington, D. C., an attempt was made to extend the professional services of the hospital to patients at home. Practical solutions to the problem of total rehabilitation of the disabled are also being sought at Gallinger. This pilot study has developed methods that materially reduce time spent in the hospital by patients receiving rehabilitation treatment. Patients in the study included those with diagnoses of hemiplegia, amputations, spinal cord injuries, major orthopedic disabilities, post-thoracoplasty tuberculosis, and cardiac disease.

During the year studies were also conducted in the fields of weight control, nutrition, and hygiene of the aging. A pilot study of the use of group methods in weight control was completed in Boston, Mass., while another pilot program dealing with the health problems of older people, was conducted in Montgomery County, Md. In addition, nutrition demonstrations and studies were completed in Brattleboro, Vt., and Columbus, Ohio.

Action Against Communicable Diseases

Despite the record of steady gains in the fight against communicable diseases, the Nation's health agencies still devoted considerable time and attention to this important public health activity. They sought, for example, to extend and improve present control programs and to find ways of combating common infections, such as poliomyelitis and influenza, which still cause much suffering and disability. In addition, they maintained vigilance against the health hazards associated with a period of mobilization and took steps to prepare their defenses against epidemics, both natural and man-made.

The primary mission of the Public Health Service's Communicable Disease Center, with headquarters at Atlanta, Ga., is to assist State and local health agencies in all these activities and to help them strengthen their programs wherever possible. The Center also has the continuing responsibility for adding to the store of knowledge about communicable diseases and their control, through research and investigation. During 1951, as in previous years, the Center made its team of specialists available to study a variety of problems of public health significance. It also extended laboratory services, both ref-

erence and evaluative, to State and local health agencies, tested and improved diagnostic techniques, provided organized training courses for public health personnel, and assisted in investigations of major outbreaks of communicable diseases.

EPIDEMIC INTELLIGENCE

During the year, the Center also reoriented its activities to meet the mounting needs of national defense. For example, it expanded those programs particularly applicable to the potentialities of biological warfare. Priority was given to studies of airborne diseases and to the development of an epidemic intelligence system which could be readily used to detect epidemics resulting from enemy action. Epidemiologists were recruited and assigned to certain strategic areas where they could observe and become familiar with natural epidemics. Thus, a corps of trained and experienced intelligence officers should be available in the event of any emergency.

INVESTIGATIONS AND CONTROL

The role of flies in the transmission of poliomyelitis is being studied intensively in two cities—Charleston, W. Va., and Phoenix, Ariz. In these control cities, epidemiological studies are backed up by year-round antifly campaigns, through the application of improved sanitation practices and the use of chemical sprays. Samples of fly specimens and sewage are collected and sent either to the Yale University Poliomyelitis Unit, or to the CDC laboratories in Montgomery, Ala., which are cooperating in the study for virus determination.

Fly control was also the basic measure used in programs designed to reduce infections and death from dysentery and diarrheal diseases. These programs are being conducted in cooperation with State and local health departments in the four States which have the highest mortality rates from dysentery and diarrhea.

Primary malaria transmission has become relatively rare in the United States, even in the formerly endemic areas. However, surveillance is still necessary. The Center continued to cooperate in residual spraying programs to eliminate the malaria-transmitting mosquitoes in 7 States. It also maintained malaria surveillance teams in 6 States which had full-scale control programs before 1951. Toward the end of the year there was a decided increase in the number of cases of malaria reported among servicemen returning from Korea. State and local health officials were alerted to the possible health hazards, and malaria surveillance teams concentrated on investigation of suspected cases of the disease.

The downward trend in reported human cases of murine typhus continued during 1951. The Center participated in the control operations

of the 12 States in which typhus is endemic. The principal methods of control are DDT dusting to eradicate the oriental rat flea, the principal vector of the disease; antirat measures, such as proper storage, collection, and disposal of garbage; and rat poisoning and ratproofing. The Center also helped States and cities outside the endemic typhus area to conduct rat control programs through training, surveys, demonstrations, and technical assistance.

Field and laboratory investigations in the ecology of encephalitis virus were continued during the year with the aim of finding practical methods of controlling the infection. Since recent findings suggest that mosquitoes transmit the encephalitis virus to humans and animals, investigators sought to discover how the mosquitoes acquire the virus, and from what source. Some progress was made, but firm conclusions depend on further research and the evaluation of existing data.

LABORATORY SERVICES

Laboratory services provided by the Center during the year included program reviews for laboratories in 26 States, special surveys of 10 local laboratories, examination of 100,000 or more specimens forwarded for diagnosis, and laboratory support in investigations of epidemics.

The Center undertook toxicological investigations to determine the health hazards resulting from the use of insecticides on fruits and vegetables. Such preparations as DDT, dieldrin, chlordan, aldrin, parathion were tested on experimental animals. Procedures are being developed to safeguard the health of people using these preparations and to assess more accurately their long-range effect on human health.

Dental Health Services

The fight against one of the most common of all diseases, dental caries, was greatly advanced during the year by clinical proof that the controlled addition of fluoride compounds to public water supplies will reduce incidence of tooth decay by 65 percent. Currently, 100 communities with a total population of almost 2 million persons are adding fluorides to their water supplies. About 100 additional communities have approved fluoridation, and another 168 are considering this step.

To encourage still wider use of fluoridation, the Public Health Service, through its Division of Dental Public Health, began an intensive program of information, training, and education. This program is being directed largely toward communities of 10,000 or less.

Most of these smaller communities, numbering about 15,600, do not have personnel trained in fluoridation. To assist States and local authorities in providing essential dental, engineering, chemical, and other technical services, additional staff members were assigned to the regional offices. Plans were developed to expand headquarters and field staff as requests for consultative and advisory services on fluoridation continued to increase.

Noteworthy progress was made in the Division's efforts to develop a more effective and simpler test for determining the fluoride content of water supplies. The test is particularly applicable to small water plants. A report on this development is being prepared.

TOPICAL FLUORIDE DEMONSTRATION

A 2-percent solution of sodium fluoride properly applied to the teeth of children will reduce tooth decay by 40 percent. This preventive procedure, of particular benefit to older children who will not obtain the full benefits of fluoridated water, was demonstrated by 35 field units in 340 locations. Since September 1948, demonstrations conducted in 1,105 focal point locations have resulted in the establishment of 450 locally financed topical fluoride programs.

Although Federal support of the Topical Fluoride Demonstration Program was curtailed during the later part of fiscal 1951, increased financial participation by State health departments and communities has permitted its continuation.

As a side effect of the topical fluoride demonstration program, schools of dental hygiene increased from 15 in 1947, to 28 in 1951. At the start of the demonstration program in 1948, 39 States and the District of Columbia licensed hygienists. They are now licensed in all 48 States, the District of Columbia, and Hawaii.

Multiple Chair Procedure

The multiple chair procedure for applying topical fluorides proved a successful device for increasing the productivity and efficiency of hygienists assigned to demonstration units. A training film documenting the procedure has been produced and distributed to interested State and local health organizations.

REMOVAL OF EXCESS FLUORIDES

Although fluoride in drinking water will reduce tooth decay 65 percent, too much fluoride will produce fluorosis, a discoloration of the teeth. The problem of how best to remove the excess fluorides present in some drinking waters and still retain the beneficial effects of 1 to 1.5 parts of fluoride per million parts of water is being studied at Britton, S. Dak., and Bartlett, Tex. In the Bartlett project, de-

fluoridation pilot plant operations have been completed, and full-scale equipment is being installed as construction of the new water treatment plant progresses.

Two patents were issued to Sanitary Engineer F. J. Maier and placed in the public domain, one involving a method for removing fluoride ions from water, the other relating to an improved method for regenerating mediums used in the defluoridation of public water supplies.

CHILDREN IN DENTAL CARE STUDIES

The first three rounds of examinations and dental treatments have been completed in the Richmond, Ind., dental care project. An average of 4,700 children received complete dental care in each of the first three rounds.

In the dental care project at Woonsocket, R. I., the first two rounds of examinations and dental treatments have been completed. About 5,600 children received examinations and complete dental treatment in each of the first two rounds. In both Woonsocket and Richmond, dental care needed per child has been successively lower for each round, reflecting the effectiveness of the programs.

One of the objectives of these various projects—increasing the dentist's productivity through the use of auxiliary dental personnel—is being documented in a film entitled, "Dental Assistants, Their Effective Utilization."

A study was made of the attitudes of community leaders in six northeastern communities visited by sodium fluoride demonstration teams. This study, now being prepared for publication, attempts to identify the principles of organization that will help communities to solve their health problems.

Arctic Health Research Center

The Arctic Health Research Center, now in its third year of operation, continued its investigations and research into human health and adjustment in low-temperature areas. The Center, with headquarters at Anchorage, Alaska, studies animal-borne disease, physiology—as it relates to metabolic rates, body temperature, and insulation of animals and of man—environmental sanitation, bacteriology, and related fields of biology and public health. Basic data concerning many fundamental problems of disease control, sanitation, and physiological adjustment to arctic living are being accumulated.

The Center is also conducting other special studies on the health status of the various population groups in Alaska. A morbidity survey, the first of its kind in Alaska, was recently launched by the Center in the Anchorage area. This survey is expected to yield more precise

information of the kind and extent of illness in the Territory and to create a clearer picture of health needs.

Since the outbreak of hostilities in Korea, emphasis in the Center program has been shifted, wherever possible, to defense-related activities.

Studies of sewage disposal systems, accidental and violent death in Alaska, and the analysis of diet and nutrition on the Alaskan population are being continued. The studies of nutrition have interrelated the factors of diet to specific food sources, population trends, psychosocial aspects of people's habits in food consumption, and the preservation and storage of food.

In another area, preliminary studies have shown that about 30 percent of the Eskimos give positive intradermal reaction to trichinosis tests. Another significant study begun last year is of echinococcosis, or dog tape worm, which has been found not only among dogs but in many animals which are important sources of food supply. Still a third special study relates to gastrointestinal disturbances in Alaska which seem to be linked to the problems of water supply and sewage disposal.

Considerable time has necessarily been given to the recruitment of a well-trained scientific and supporting staff in order to develop a well-rounded program of research and investigation.

The Center continued to assist the Territory of Alaska in meeting some of its pressing health problems. By assigning professional personnel to the Alaska Department of Health and by making supplementary funds available, the Public Health Service helped to strengthen and enlarge health services throughout the Territory.

Health Education

One of the objectives of the Public Health Service is to develop a popular awareness of health needs. The Service gives momentum and direction to the effort—in part, through its Division of Public Health Education. During the past year, the Division assisted 14 States and 15 communities in health education procedures, its aid varying from a comprehensive State program to a brief consultation with a local institution for underprivileged girls.

The Division of Public Health Education assisted operating units of the Public Health Service in the educational phases of their activities through joint program planning, recruitment, training and assignment of personnel, and in pretesting and evaluation programs. Advice on methods of pretesting and evaluation was given to seven Divisions. Experimental testing of eight other programs was performed.

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At the request of the Division of Chronic Disease and Tuberculosis, a pretest and evaluation of the effectiveness of a program of group instruction on self-care for individuals with diabetes was carried out. Among the educational materials pretested for reading difficulty, understandability, and the extent to which the information applied to the audience for which it was intended, were two pamphlets on self-examination of the breast for cancer, a pamphlet on environment and health, a projected movie on heart disease, a manual on rat-borne disease in the United States, an inquiry card on reactions to a new style of abstracting current venereal disease literature, a pamphlet on medical certification of cause of death, and pamphlets used in mass chest X-ray surveys.

The Division of Public Health Education assisted the Division of Dental Public Health in a study to identify the principles of organization most effective in encouraging communities to solve local health problems.

The Division also advised the Institutes of Inter-American Affairs and the Economic Cooperation Administration on the recruitment of health education personnel in other countries. Technical advice was given to health educators assigned to Indochina, Burma, Thailand, Peru, Brazil, Chile, and Greece.

A working relationship in problems of school health has been developed with the Children's Bureau and the Office of Education. As a result, "Priorities in Health Services for Children of School Age" was developed and published jointly by these two agencies and the Public Health Service. A second publication, "Better Health of School Age Children," has recently come off the presses. Similar cooperative activity between State school officers and health officers has been developed with assistance from the Public Health Service and the Office of Education.

Hospital and Medical Care

Historically, the first function of what is now the United States Public Health Service was the provision of medical and hospital care for the Nation's merchant seamen. Through its Bureau of Medical Services, the Public Health Service has widely expanded its activities in this field. The facilities of the Service, and the large number of its commissioned and civil service employees—about half of all Service personnel—engaged in providing medical and hospital care to thousands of Americans, constitute a significant part of the Nation's health resources.

Hospitals of the Public Health Service

The Public Health Service's hospitals, clinics, and medical offices serve segments of the population designated by Congress as beneficiaries of the Public Health Service. American merchant seamen, officers and enlisted men of the United States Coast Guard, Coast and Geodetic Survey officers and crew members, and commissioned officers of the Public Health Service are among the eligible occupational groups. Other persons receive medical attention by the Service because of illness requiring long and specialized hospitalization—patients with Hansen's disease (leprosy) and men and women who are addicted to narcotic drugs as defined by Federal law.

The Public Health Service operates 23 hospitals, 18 full-time out-patient clinics, and over 100 part-time out-patient offices. The Ellis Island hospital was closed early in 1951, and the patients transferred to other establishments. The hospitals are located chiefly in busy shipping ports; the clinics and offices are in smaller centers where designated beneficiaries are less numerous. During the year, nearly 70,000 patients were admitted to the hospitals, an average of 189.7 per day. The average daily in-patient census was 7,347.9 and the number of visits to out-patient stations totaled 1,072,252.

At the close of the year, the former United States Marine Hospitals—21 of the 23 stations—were redesignated as United States Public Health Service Hospitals.

HANSEN'S DISEASE

The United States Public Health Service Hospital at Carville, La., is the only institution in the continental United States where a patient with Hansen's disease (leprosy) may be assured of proper care and treatment. Since the stigma attached to this disease from earliest times still persists in some measure, the program at Carville seeks to meet the social, as well as the medical problems that occur for its victims.

From January 1, 1941, to December 31, 1950, the Carville Hospital admitted more than 500 patients. They came from 40 States, the District of Columbia, the Philippine Islands, Hawaii, and the Canal Zone. Over 60 percent were foreign born, the largest number of this group coming from Mexico.

The successful trial of the sulfone drugs has been the hospital's most noteworthy accomplishment. The administration of promin, diasone, promacetin, and sulphetrons has improved not only the Hansen's disease involvements but also the general health of the patients.

The expansion of the physical therapy and occupational therapy services have also brought good results. In 1950 a medical social service program was initiated.

The Carville Hospital has grown into a self-contained community with a governing body composed of patients; social and benevolent organizations such as the Boy Scouts, American Legion, and Lions Club; weekly and monthly publications; a local post office; and a wide range of recreational and athletic facilities. The public's increasingly humane and realistic attitude toward the patients is a notable sign of progress. Where 10 years ago very few visitors came to the hospital, the staff now spend some part of almost every day receiving guests. The Baton Rouge Symphony Orchestra, members of the School of Music at Louisiana State University, and other entertainment groups appeared at Carville during the past year.

NARCOTIC ADDICTION

The United States Public Health Service Hospitals at Lexington, Ky., and Fort Worth, Tex., are concerned with the physical and mental rehabilitation of persons addicted to narcotic drugs. Certain Government beneficiaries suffering from other mental illnesses also receive treatment. During the year, these hospitals reported record population figures, reflecting increased voluntary admissions. The Lexington and Fort Worth Hospitals admitted 5,666 patients at a daily average rate of 15.5. The number of patients treated totaled 7,986. The facilities for treating addicts were frequently taxed heavily during the year. The Lexington hospital with a capacity of 1,400 had a total of over 1,500 patients in November 1950.

The treatment of drug addicts usually consists of two phases—the removal of physical dependence and the relief of psychological dependence upon the drugs. The former is a relatively easy procedure, consisting of gradual withdrawal of the drug over a period of 2 weeks or less. The alleviation of psychological dependence is a more difficult process. Time spent in a drug-free environment is a significant factor. Patients who leave immediately after withdrawal from drugs almost invariably relapse. Studies indicate that the addict does not return to physiological normality for approximately 4 months.

During the year, the newspapers, magazines, radio, and television stations over the country devoted much attention to the upsurge of addiction among youngsters under 21. A study of the records at Fort Worth and Lexington shows that in 1946, patients below the age of 21 comprised 3 percent of the census; by 1951, when the patient count was higher, the proportion of addicts in this age group had risen to 18 percent. Many of these youngsters gave no history of crime or delinquency prior to addiction. Psychiatrists tend toward an opti-

mistic view for these young people. Their problems are not comparable to those of older addicts. The Service feels called upon to do everything possible to save these young people from years of tragedy.

FREEDMEN'S HOSPITAL

Freedmen's Hospital in Washington, D. C., established during the Civil War to give treatment and care to sick and destitute Negro refugees, has 347 beds for general medical and surgical care, 51 bassinets, and a separate 135-bed annex for patients with tuberculosis. A total of 12,075 persons received in-patient care during the year, a slight increase over 1950. The out-patient service with its 37 clinics and emergency operating room gave treatment to over 100,000 people.

A total of 180 physicians and other hospital personnel received training during the year at Freedmen's Hospital. The hospital now has American Medical Association approval for specialized training in internal medicine, radiology, dermatology, syphilology, urology, surgery, obstetrics and gynecology, neurology, pulmonary diseases, pediatrics, and orthopedics. The close cooperation between Freedmen's Hospital and Howard University continued.

Foreign Quarantine Service

In the calendar year 1950, our Nation had its lowest incidence of smallpox—42 cases—while altogether 216,526 cases of this disfiguring disease were reported in 71 foreign countries, including 500 cases in Mexico. England and the Netherlands were among the nations reporting outbreaks in 1951. Quarantine officers vaccinated 266,422 persons arriving in the United States during the year.

Jungle yellow fever spread markedly in the Andean region of South America, and a severe flare-up occurred in recently settled areas of central Brazil; most significant was its spread northward from Panama into Costa Rica, which is outside the designated endemic area. Health authorities in the Miami, Fla., area expressed concern over the high index of *Aedes aegypti* (the yellow fever mosquito) in this region; this mosquito is prevalent in southern United States. Eighty-two laborers en route from the interior of British Guiana were detained at San Juan, P. R., for the 6-day incubation period of yellow fever, because insufficient time had elapsed to establish immunity after their vaccination.

There were 20,417 arrivals of ships from abroad, 28,311 of aircraft, and 31.6 million of persons subject to foreign quarantine regulations.

Entomological surveillance of airports—carried on to prevent introduction of medically important insects—was extended to included several reactivated military air fields.

The Chief of the Division of Foreign Quarantine served as chairman of the World Health Organization's Expert Committee on International Epidemiology and Quarantine when it met in Geneva, Switzerland, to revise the draft of International Sanitary Regulations. These Regulations will become effective October 1, 1952. A representative of the Division served on WHO's Expert Committee on Insecticides, which promulgated recommendations regarding the disinsecting of ships and aircraft. Because of its experience in disinsecting ships, the Division has been requested to assist WHO in planning a scientific study of problems relating to accidental transportation of medically important insects by ships.

The exclusion of persons with mental defects, tuberculosis, and dangerous contagious diseases as required by law constituted a significant contribution to our fight against these conditions in our own population. The Service made 1,697,790 examinations of persons seeking admission to the United States, and certified 7,775 as having excludable diseases (certifications included 625 cases of mental disease, 3,921 of tuberculosis, 4 of leprosy).

Expansion of the displaced persons immigration program required further extension of the displaced persons medical examination activities carried on since 1949 in addition to the regular immigration medical work. Through the inclusion of new categories of refugees, the work load was increased in Germany and Austria, and operations were extended to Greece, Great Britain, and the Philippine Islands. The displaced persons work was conducted under many handicaps, including an insufficient number of qualified medical examiners. There has been a high prevalence of tuberculosis among the displaced persons, resulting in an accumulation of tuberculosis suspects among visa applicants. By May 1951, more than 3,800 applicants were being observed for this disease. In order to reach a decision on these cases prior to expiration of the Displaced Persons Act, the Service appointed a Board of Tuberculosis Specialists (one member from the Public Health Service, three from outside) to appraise the cases in Europe. The Board found 70 percent of these applicants ineligible for immigration.

Foreign Quarantine Regulations were amended to legalize the procedure of boarding ships for quarantine and immigration medical inspection at the dock instead of in a quarantine anchorage. Dockside boarding was instituted at an additional major station—Tampa, Fla.

Medical Services for Federal Agencies

The Public Health Service details medical, dental, psychiatric, and nursing personnel to aid various Federal agencies with their health

programs. The duties of these professional workers carry them to Indian reservations, to foreign lands, to prisons, and to distant seas in ships. Wherever they go, they contribute to the health of Americans.

OFFICE OF VOCATIONAL REHABILITATION

The basic objective of the Federal-State program of vocational rehabilitation is to restore disabled persons in body and spirit, to aid their progress toward the dignity of self-support. The medical services of this program are essential in correcting or alleviating conditions which are a handicap to employment. Among the persons who have required rehabilitation over the past few years, there has been a steady increase in the percentage receiving medical and surgical treatment and other restoration services. In 1951, 40 percent of all rehabilitation cases received such treatment.

Interest in establishing rehabilitation centers continues to grow throughout the country. The Office of Vocational Rehabilitation, Federal Security Agency, is frequently called upon by Federal and State agencies to assist in the evaluation of the need for a center, and to advise on problems of organization and operation. Concurrently, the need for physicians trained in rehabilitation techniques is also increasing. It is the aim of the Office to develop means by which medical officers of the Public Health Service and other physicians may gain experience in working with community and State rehabilitation programs, and thereby acquire knowledge of the problems involved and experience in the required skills.

Public Health Service Committee

The medical, social, and vocational rehabilitation of disabled persons is a public health problem of necessary importance. The Public Health Service has long had an interest in the medical and related aspects of rehabilitation. This has been evidenced in the assignment of Service personnel to the medical program of the Office of Vocational Rehabilitation, and in the development of research, training, and control programs in mental health and chronic diseases.

Early in 1951, the growing interest in rehabilitation culminated in the appointment by the Surgeon General of a Committee on Rehabilitation in the Public Health Service. The responsibilities of the Committee include: (1) study of the existing rehabilitation activities of the Service; (2) work with the program divisions on ways and means of strengthening rehabilitation services; and (3) development of proposals for new or increased rehabilitation activities. The committee functions in an advisory capacity to the Surgeon General and is expected to formulate policies for his consideration.

The Committee on Rehabilitation is under the chairmanship of the Chief of the Bureau of Medical Services, and its membership includes the Director of the Office of Vocational Rehabilitation and representatives from each bureau. A task force has been appointed to assist the committee in its fact-finding studies and in the coordination of data and recommendations. The task force comprises representatives from each of the bureaus and the Office of Vocational Rehabilitation. It includes individuals from the fields of medicine, dentistry, nursing, medical and psychiatric social work, education, vocational counseling, and public health administration.

At the close of the fiscal year, the task force had completed a survey of 15 divisions of the Public Health Service. It had developed a series of recommendations for consideration by the committee covering: (1) rehabilitation in specialized health programs; (2) training of rehabilitation personnel; (3) research in rehabilitation; and (4) rehabilitation of employees of the Federal Government and of private industry.

BUREAU OF EMPLOYEES' COMPENSATION

Under provisions of the Compensation Act of 1916, medical care is provided to Federal civil employees for injuries received in performance of duty, and for diseases attributable to conditions of employment. Medical examinations and treatment, including out-patient or hospital care, are provided through the facilities of the Public Health Service hospitals and clinics and, to a limited extent, the medical installations of other Federal agencies.

An average of 30,000 to 35,000 cases were under consideration at all times during the year. These cases involved medical care, hospital services, dental care, prosthetic appliances, and preventive services.

One of the most important activities of the Bureau is the cooperative research and special studies program. Valuable progress was made during the year in the continuing research program set up several years ago for the study of mustard-gas bronchitis which occurred among employees of a Federal arsenal in Alabama. The in-patient clinical aspects of the study have continued at the Memphis Public Health Service Hospital with commendable results. Therapy for the patients has been directed in such a way as to take care of the basic pathologic physiology, and an apparent arrest of progression of the condition has been noted in a few cases.

Since claims for compensation involving retinal detachment have been occurring with considerable regularity, arrangements are being made for special study with reference to the etiology of this condition, with special emphasis on the role of various forms of trauma as a causative or aggravating factor.

Research is continuing on the relationship of various infectious diseases and industrial accidents to working conditions in Federal medical installations. For example, special studies are going ahead on tuberculosis as an occupational hazard in tuberculosis hospitals and medical installations; and on Q fever, brucellosis, and infectious hepatitis as related to work in laboratories and in the bureaus of the Department of Agriculture concerned with animal husbandry and dairying.

In keeping with the provisions of recent legislation, the Bureau is continuing to expand its rehabilitation services. A major part of this program is the cooperative service provided through various State vocational rehabilitation agencies. The special project established through the Alabama State Vocational Rehabilitation authorities for the rehabilitation of Federal arsenal employees disabled by mustard-gas bronchitis has produced gratifying results. A number of patients have now been rehabilitated for selective placement in other occupations.

Through the Office of Vocational Rehabilitation, Federal Security Agency, arrangements have been made with the Virginia State Vocational authorities to make use of the Woodrow Wilson Rehabilitation Center at Fisherville, Va., for the Rehabilitation of Federal employees. The center has excellent facilities for training disabled persons for various new occupations, and is prepared to give full in-patient services to patients not only from Virginia but from all parts of the country.

The pilot study on the rehabilitation of patients receiving medical care in Government hospitals has continued on a limited scale, due to the lack of funds and personnel. At the present time, the work is confined to surgical cases in the orthopedic services of three hospitals. It is the aim of the Bureau to extend this program by securing the active cooperation of surgeons throughout the country who are designated in accordance with the Compensation Act to care for Federal employees.

BUREAU OF PRISONS

The Public Health Service has furnished medical, psychiatric, dental, and nursing services for 21 years to the institutions operated by the Bureau of Prisons. The medical program aims to prevent the introduction of disease into the institutions, to treat disease and injuries incurred by the prisoners and staff, to correct remediable defects insofar as possible, and to conduct or assist in medical and psychiatric research.

More time has also been devoted to the rehabilitation of the sick and injured. Group therapy has been put to use more widely to determine the value of this type of psychiatric treatment in the prison setting.

Existing research projects were continued and arrangements made for new projects. In cooperation with the Laboratory of Tropical Diseases of the National Institutes of Health, a research project on malaria was started at the Atlanta Penitentiary. At the request of the Army and Navy, certain types of drugs developed during the war for the treatment of malaria will be evaluated. The primary purpose of the research is to find a drug to cure rather than simply suppress the disease.

During the year, plans were developed with the National Institutes of Health to start a project at the Federal Correctional Institution at Seagoville, Tex., on the epidemiology of human intestinal protozoa. This study is expected to reveal information which will be of value in the study of amebic dysentery.

An experimental project dealing with infectious hepatitis was begun at the Danbury institution in cooperation with the Armed Forces and Yale University. About 15 inmate volunteers have been selected for inoculation with a potent virus. This research will be directed toward detecting the size of the virus particles with a view toward attempting to remove the virus from plasma by ultrafiltration.

In many States the departments of health have been very cooperative with the institutions in performing X-ray surveys annually on both inmates and personnel. At the same time, many of the institutions have aided communities in such projects as blood banks and the development of civil defense programs.

UNITED STATES COAST GUARD

Since the vital weather ships of the Coast Guard are often at sea for weeks at a time without returning to port, the Public Health Service has assigned physicians to provide medical care for the crews. This service has resulted in improved health conditions aboard the ships and better morale.

One new complete motorized dental unit was commissioned during the year, and contracts were awarded for three additional units. These units provide a considerable dental service of a high quality to personnel on duty in isolated areas, and are an important morale factor.

Numerous inspections of medical and dental facilities were made during the year to improve the physical conditions of the various sick bays and infirmaries. Plans were drawn up and approved for Port Security Barracks' sick bays and dental clinics in various areas, as well as for the reestablishment of hospital spaces on two quarter barges.

MARITIME ADMINISTRATION

The medical service of the Maritime Administration, in the United States Department of Commerce, is staffed by medical, dental, and

nurse officers of the Public Health Service. The health program includes medical and dental in-patient and out-patient care for enrollees of the United States Maritime Service, and for Cadet-Midshipmen of the United States Merchant Marine Cadet Corps; the operation of health units in Washington, D. C., and New York City; and emergency rooms at eight Maritime Administration Reserve Fleets.

During the past year, medical and dental officers assisted in instruction in first aid and preventive medicine at several training facilities. The medical officers also cooperated in the accident prevention programs of the various units.

As in previous years, close cooperation was maintained between the reserve fleets and training stations on the one hand, and the United States Public Health Service and State health departments on the other hand, in matters relating to sanitary, safety, and bacteriological surveys.

BUREAU OF INDIAN AFFAIRS

Mortality and morbidity rates among Indians for whom the Bureau conducts a comprehensive health program continued to decline during the year, but still closely parallel the rates that prevailed among the general population some 40 to 50 years ago. This lag undoubtedly reflects the limited funds and personnel available for health services to the Indian population. Hospitals for the care of Indians were understaffed during the year, and no organized preventive disease program was in operation, except for the inadequate field nursing service provided in a few areas.

Health Services

Individual service programs carried out during the year included tuberculosis case finding, BCG vaccination in the control of tuberculosis, the topical application of fluoride among children as a dental caries preventive, and blood surveys for the detection of syphilis.

The development of BCG vaccine has made it possible to plan a service-wide vaccination program for newborn babies for 1952. This will be supplemented by a similar program for school-age children.

Material progress has been made in the expansion of the dental services program. The chief dental officer, assigned by the Public Health Service in 1950, has established headquarters in Denver, Colo., a point centrally located for service to Indians in the western United States. A Service-wide inventory of dental material has been completed, and a great deal of needed dental equipment and supplies have been obtained, mostly by transfer as surplus property from other Government agencies.

A total of 23,169 Indians were examined during the past year by the three mobile chest X-ray units. During the summer months, 3 additional units were on loan from the Public Health Service. Beds

available for tuberculosis treatment are inadequate in number, especially in the Southwest; but considerable assistance in hospitalizing tuberculous Indians is being given by States.

Hospitals

As of June 30, 1951, the Bureau was operating 62 hospitals, ranging in capacity from 15 to 420 beds. At Mount Edgecumbe, Alaska, 420 beds are now available. At Tacoma, Wash., an additional floor has been opened for tuberculosis patients. The 100-bed addition to the Montana State Sanatorium for Indians is under construction and should be in service early in 1952. At Anchorage, Alaska, a 400-bed hospital is under construction. Plans have been drawn for a 200-bed general hospital at Albuquerque, N. Mex., under management by Bernalillo County, which will have facilities for 80 Indians. A medical center, staffed by specialists in medicine and surgery, has been established at Pine Ridge, S. Dak. An emergency appropriation has been obtained for replacement of the 70-bed hospital at Bethel, Alaska, destroyed by fire during the year.

During the past several years, the turn-over in personnel has been great, and recruitment has been difficult. At the year's end, 125 medical officers were on duty in Indian hospitals, of which only 88 were full-time Bureau employees. About 250 physicians are needed to staff all Indian Service hospitals fully, but only 175 positions have been established for physicians. Many of the hospitals are operating with but one full-time physician, and two others are served part time by local practitioners. Supervisory medical service is rendered by 13 medical officers in the Central and Area offices, 7 of them detailed from the Public Health Service.

Training Programs

Because of the difficulty of obtaining an adequate number of nurses for its hospitals, the Bureau of Indian Affairs has spent considerable time and effort in nurse recruitment. Enrollment of students at the Kiowa School of Practical Nursing has been increased, and the course lengthened from 9 to 12 months, keeping abreast of changing conditions in the field.

Arrangements have been completed with the Training Division of the Public Health Service's Communicable Disease Center, Atlanta, Ga., for a training course in general and environmental sanitation for Indians who wish to take up this work. The course will be conducted on Indian reservations designated by the Bureau.

DEPARTMENT OF STATE

The health programs for Foreign Service personnel and for State Department employees have now been consolidated.

During the year approximately 6,000 medical examinations were ordered. In the past, these examinations were all conducted through the facilities of other Government agencies or through contracts with private physicians. This year, an examining facility with laboratory and X-ray has been completed in Washington, which, it is expected, will be able eventually to handle all examinations for the Foreign Service, the State Department, and other agencies closely associated with the Department.

New health units were established at Saigon, Bangkok, Madrid, Karachi, and Frankfurt, and an American nurse was assigned to Paris to take charge of the nursing program at this post. Arrangements were made to make use of military doctors at Djakarta and Saigon. The doctor at Saigon will also travel to Bangkok when needed. Assistance was given to existing health units at New Delhi, London, Belgrade, Warsaw, Cairo, Rome, Djakarta, Manila, and Tehran.

Progress in World Health

During the last 3 years, the world has seen greater improvement in health conditions than in any similar period in history. In spite of the troubled political outlook and precarious economic conditions, there is now far greater security of life in most free countries than ever before.

Low death rates are no longer a virtual monopoly of North America, Australia, New Zealand, and Northern Europe, as was the case before World War II. The general death rate of Italy in 1950 was 9.7 per 1,000 population, as compared with 9.6 for the United States. Malta, which up to the time of the war had death rates of 20 per 1,000 and over, had a rate of 10.7 per 1,000 in 1949. The improvement appears even in tropical countries. The 1949 general rates of 12.5 in Ceylon and 11.0 in Venezuela were the lowest on record in these countries.

The postwar expansion of international health programs has done much to bring about this recent progress in world health. The United States has taken a leading role in these programs, both through international agencies such as the World Health Organization and the Pan American Sanitary Bureau, and through bilateral programs with other democracies. During the year, the emphasis on aid to underdeveloped areas has been intensified. The immediate goal is to help the governments of these areas apply modern methods to their public health problems.

Despite the successful campaign of recent years, further efforts are essential to achieve a healthier world. Although approximately 50 million individuals are protected from malaria by residual DDT spraying, for example, there remain an estimated 500 million per-

sons who suffer from malaria annually. Many other serious, debilitating diseases which can be eliminated are greatly reduced by modern public health methods prevail in underdeveloped areas, chiefly throughout the tropical and subtropical regions. Programs directed against these diseases have the dual advantage of promptly improving the health and well-being of a large section of the population and of demonstrating to the people the benefits of modern public health work.

Role of the Public Health Service

The Public Health Service has assumed responsibility for planning, staffing, and supervising bilateral health programs in the Economic Cooperation Administration, and in the Technical Cooperation Administration (TCA) of the Department of State. A Public Health Service officer is in charge of the health program of the Institute of Inter-American Affairs, another agency of the Department of State. In addition, officers of the Service assigned to certain embassies and consulates of the United States render many services in the international health field.

The Public Health Service is also the official United States liaison with the World Health Organization and the Pan American Sanitary Bureau (PASB). Since the inception of WHO in 1948, the Surgeon General of the Public Health Service has served as Chief Delegate of the United States to the World Health Assembly, and officers of the Service are this Government's representatives on the executive boards of WHO and PASB. At the Fourth World Health Assembly, held at Geneva, Switzerland, in May 1951, the Surgeon General was unanimously elected President of the Assembly for a term of 1 year.[4]

All international activities of the Public Health Service are coordinated and administered by the Division of International Health in the Office of the Surgeon General. During the year, the work of the Division has been greatly expanded, primarily because of the increased activities of ECA and TCA.

Coordination of Bilateral and Multilateral Programs

During the year, special efforts have been made to coordinate bilateral programs with those operated by international agencies such

[4] United States Delegation: Leonard A. Scheele, M. D., Surgeon General, U. S. Public Health Service, Chief Delegate; Roy Cleere, M. D., Executive Director, Colorado State Department of Health; and Mrs. India Edwards. Alternates: Frederick J. Brady, M. D., U. S. Public Health Service; H. Van Zile Hyde, M. D., Director of Health and Sanitation, Institute of Inter-American Affairs; and Howard B. Calderwood, U. S. Department of State. Congressional Advisors: The Honorable Herbert H. Lehman, New York, and the Honorable Richard M. Nixon, California. Seven technical advisors and secretarial staff accompanied the Delegation.

as the WHO, PASB, and UNICEF (United Nations International Children's Emergency Fund). In southeast Asia, for example, coordinating committees have been established in each country. The committees include representatives of ECA (Economic Cooperation Administration) and WHO as well as representatives of the Government. Requests of each country for bilateral and multilateral health projects are reviewed by its coordinating committee, and action by the appropriate agency is thus expedited. In Vietnam, for example, WHO was unable to inaugurate a program because the Vietnamese Government did not have sufficient local currency to contribute its financial share. Through the ECA, the Vietnamese Government obtained counterpart funds for this project which has now been launched by WHO.

The Public Health Service maintains close relationships with WHO and its Regional Offices. During the year, officers of the Service attended the WHO Western Pacific and Southeast Asia Regional Conferences, while representatives of WHO and UNICEF participated in a Southeast Asia Public Health Conference held by ECA in Bangkok. During the past year, five experts of the Service have been loaned to WHO as consultants.

Public Health Missions in 1951

The Public Health Service operated health programs in eight countries during 1951. In six of these countries—Greece, Turkey, Indonesia, Indochina, Thailand, and Burma—the health missions are part of the ECA over-all program. For the TCA, the Service is operating health programs in Liberia and Iran, as well as a regional training program for all Near East countries. At the close of the year, plans had been approved for ECA health programs in Formosa and the Philippines and for TCA programs in Ethiopia, India, Israel, and Jordan. The Public Health Service had also submitted proposals to TCA for programs in 12 additional countries. More than 120 public health workers have been recruited for the ECA and TCA programs.

BURMA MISSION

The program in Burma was initiated in November 1950. The Mission is composed of a chief public health officer, eight physicians, four nurses, four sanitary engineers, a health educator, two entomologists, and a sanitarian.

One of the most urgent needs in Burma is the rehabilitation of the country's bombed-out hospitals. A preliminary survey conducted in 1951 showed that only about 8,000 hospital beds—more than half of them in temporary buildings—remained to serve a population of 16

millions. A long-range national hospital plan is being developed, including a training program for Burmese technical and medical personnel to construct and operate the new hospitals.

Some progress has already been made in malaria control, venereal disease control, and environmental sanitation. In the southern part of Burma, where there are many refugee camps without adequate water supplies, a public health team is supervising the construction of an improved water system. The public health teams in all of these activities are made up of Burmese health personnel under the supervision of the Mission's staff. Burmese physicians are being trained to assume future leadership.

GREEK MISSION

The Public Health Mission to Greece has completed its fifth year. The projects in operation during the year included malaria control, hospital construction, nurse training, environmental sanitation, and venereal disease control. A large proportion of the work initiated in earlier years by the Mission has now been taken over entirely by the Greek Government. In this respect, the mission to Greece may serve as the pattern for other bilateral health programs.

The nurse training program continued to expand, and the work of visiting nurses in the health centers improved. A total of 456 students—twice as many as 3 years ago—was enrolled at the 4 Schools of Nursing in Greece.

INDOCHINA MISSION

Guerrilla warfare and political insecurity have made it difficult to develop a coordinated health program in Indochina. The country has only 230 physicians for a population of about 17.5 millions, and very few of these doctors devote time to public health work. The Public Health Mission to Indochina has therefore concentrated on Vietnam, where the immediate possibilities are greatest. The Mission is composed of a chief public health officer, four physicians, two nurses, a sanitary engineer, a health educator, a parasitologist, an entomologist, and a hospital administrator.

A trachoma control project started in September 1950 had 7 native teams in operation in North Vietnam by the close of the year, and 3 more teams were being formed. About 80,000 patients had been treated and more than twice that number had been examined for clinical evidence of the disease.

Between 60,000 and 100,000 persons are hospitalized in Vietnam each year for malaria, and upward of 350,000 clinic visits are made by persons with the disease. A malaria control program has been inaugurated with a view to reducing preventable deaths and sickness.

The Mission has trained civilian and army teams in DDT residual spraying, and during the year more than 114,000 houses in certain parts of Vietnam were sprayed. In addition, between 30,000 and 35,000 persons showing symptoms of malaria were treated with chloroquine. Nearly half a million posters and pamphlets were distributed in a malaria information program.

Under the supervision of the Mission, a village sanitary well project has been introduced in Vietnam. By the end of the year, 35 village wells had been completed and 245 were under construction.

Hospital equipment and medical supplies costing more than $250,000 have been provided by the Public Health Mission to 27 of the neediest hospitals in Indochina. Four prefabricated hospitals have been procured for Vietnam.

INDONESIA MISSION

The Public Health Mission to Indonesia, begun in October 1950, consists of a chief public health officer, three physicians, a nurse, a sanitary engineer, and an entomologist. As in other Southeast Asia countries, control of malaria, trachoma, venereal disease, and other infections, better sanitation, better maternal and child health services, nutrition, and public health nursing are the primary needs. With only one physician per 100,000 population, Indonesia needs technical assistance in the field of public health and medicine.

Hospital and laboratory supplies and pharmaceuticals, costing $3,500,000, have been ordered for the restoration of Indonesia's medical schools, hospitals, and laboratories. The Malaria Institute, part of the Eyckman Institute and malaria control branch of the Indonesian Ministry of Health, is being restored. Four DDT spraying projects were in operation at the close of the year.

A class in nursing has been started for Indonesian nurse-midwives who are interested in obtaining fellowships for advanced study outside the country. The Mission's nursing consultant has conducted training classes for nurses of the Ministry of Health.

Medical fellowships have been provided through the Mission to enable a number of prominent Indonesian physicians to take advanced training in the United States.

IRAN MISSION

The first comprehensive technical cooperation program initiated under Point Four was started in Iran early in 1951. Experts in the fields of health, agriculture, industry, and education are cooperating in an integrated rural development program. During the year, the Public Health Service assigned to the Mission a medical director, a chief sanitary engineer, and two nurses.

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The Iranian Government's malaria control program has been expanded. A large-scale DDT residual spraying program is under way. Some 7,000 villages were sprayed during the year. Iranian manufacturers are now producing some spraying equipment. By arrangements with 1 Iranian manufacturer, 2,000 sanitary privies were built for use in demonstration villages. Sanitary wells have also been dug in these villages, and an irrigation system has been started in the demonstration area.

LIBERIAN MISSION

The Public Health Service Liberian Mission, established in 1944, was integrated in 1951 with the TCA program. The staff is composed of a medical director, two physicians, two nurses, a sanitary engineer, an X-ray specialist, and a laboratory specialist. Their advisory services to the Liberian Government in malaria control, nurse training, and other health fields were continued. A midwifery program is in operation at the school of nursing in Monrovia for training instructors who will return to their native villages to train local midwives.

THAILAND MISSION

The Mission to Thailand, started in February 1951, is composed of a chief public health officer, five physicians, two nurses, two sanitary engineers, one health educator, three entomologists, one parasitologist, and a consultant in maternal and child health.

Malaria cases in Thailand are estimated at up to 3 million annually and 20 percent of all deaths are ascribed to this disease. The Mission is cooperating with the WHO, UNICEF, and the Thai Government in a demonstration initiated in 1949. Progress during the year included the spraying with DDT of 40,606 houses in two northern provinces, thus protecting nearly 200,000 persons. A similar demonstration of filariasis control is being developed in an endemic area with a population of 100,000.

A venereal disease control program, employing penicillin therapy, has been inaugurated. A venereal disease consultant furnished through the Mission is teaching in the two medical schools of Siriraj and Chulalongkorn in Bangkok.

An intensive trachoma campaign among school children was launched in one province and will soon be extended to four others. A total of 4,500 school children have been examined and about 1,700 of these have received treatment. The Mission has assigned a consultant in infectious diseases of the eye to the project and has provided 194,000 tubes of aureomycin ophthalmic ointment, as well as 100 bicycles for use of the trachoma teams.

Equipment and materials for construction and maintenance of 4,000 shallow wells have been ordered to provide satisfactory water supplies in the rural sanitation program.

The Mission is participating in a nutrition program established by the Thai Ministry of Health and the Chulalongkorn Red Cross Hospital. Nutritional capsules and laboratory supplies have been provided.

TURKISH MISSION

The Public Health Mission to Turkey, consisting of a medical officer, a sanitary engineer, and a malariologist, arrived in Ankara at the end of March 1951. In cooperation with the Turkish Government and the Ministry of Health, plans were developed for a large-scale malaria control program.

During the past 5 years, Turkey through its own program has reduced the number of malaria cases by half, from 2.5 million to 1.2 million annually. Locally manufactured DDT was used, the supply increasing from 18 tons of technical DDT in 1947 to a high of 115 tons in 1950.

Two mobile units have been organized to conduct a health demonstration and education program in various parts of the country.

Education and Training

During the year, 523 health workers from all parts of the world were assisted by the Public Health Service in connection with their training or other official visits in the United States. Of these, 290 were fellows from 50 countries, sponsored by various United States and international agencies. Their study programs and field training assignments were planned and administered by the Public Health Service. Most of these fellowships were for 1 year or longer.

The 233 visitors from 54 countries were here for shorter periods and were sponsored by their own governments, private organizations, or international agencies.

REGIONAL TRAINING IN BEIRUT

To serve the needs of the Near East for training in public health, agriculture, public administration, statistics, and other fields, the TCA established a regional training center at the American University, Beirut, Lebanon. Since April 1951, a medical director of the Public Health Service has been on assignment as consultant for the University and the Near East countries. It is hoped that the American University in Beirut will be the first of several regional training cen-

ters to serve the need for producing rapidly large numbers of technical experts without requiring travel to the United States or other remote places for prolonged training.

AFFILIATION PROGRAM

Early in the year, a plan was developed for the affiliation of medical schools in various Southeast Asia countries with United States schools of medicine. This plan will implement the concept of training public health and medical personnel as near to the home field as possible. The first medical school to adopt this proposal was the Washington University College of Medicine, St. Louis, Mo. The school has contracted with ECA to send a staff of 10 medical and nursing instructors to the two medical schools of Thailand in Bangkok.

The World Health Organization

The Fourth World Health Assembly, held at Geneva, Switzerland, from May 7 through May 25, 1951, was attended by delegates from 70 countries and by observers from 20 international organizations. One of its outstanding accomplishments was the adoption of new sanitary regulations relating to international traffic. The new WHO Regulations, which will go into effect October 1, 1952, will bring virtually the entire world—except for the Communist bloc of nations—under a single set of rules for preventing the international spread of epidemic disease.

Among other notable WHO achievements during its 3 years of existence are the standardization of biological products and the development of an International Pharmacopoeia. The International Pharmacopoeia, published in 1951, makes it possible to procure drugs made to uniform strength in any part of the world. The Expert Committee on Standardization has adopted new international standards for penicillin, vitamin E, and heroin. Through its Expert Committee on Habit-forming Drugs, WHO is making a significant contribution to the work of agencies dealing with a problem of growing concern—the international traffic in these drugs.

The new International List of Causes of Death, adopted in 1950, will bring the nations of the world closer to comparable vital statistics than ever before. WHO's Epidemiologic Intelligence Service has also been a powerful influence on the improvement of disease reporting.

In the coming year, WHO will train public health workers and carry out demonstration projects in such fields as malaria, tuberculosis, venereal disease, other infectious diseases, nutrition, maternal and child health, and sanitation. With extensive cooperation from the

United Nations International Children's Emergency Fund, services in these and other fields will be rendered in 1952 to about 60 countries and some territories.

WORLD HEALTH BUDGET

To accomplish these and many other aims, WHO will operate for the first time a coordinated program on a world-wide basis, irrespective of the source of funds. Activities will be financed from WHO's own regular budget, from the United Nations fund for Technical Assistance for Economic Development, and from the United Nations International Children's Emergency Fund.

The 1952 working budget adopted by the Fourth World Health Assembly will be about 25 percent larger than that for 1951. The amount approved by the assembly is $7,700,000 as compared with $6,300,000 in 1951. The failure of the Communist countries to participate, plus delayed payments from certain other countries, will automatically reduce the $7,700,000 budget by about $1,000,000. However, WHO is to receive about 22 percent of the funds available through the United Nations, and UNICEF is expected to spend about $5,000,000 for health programs under WHO's technical guidance.

The Fourth World Health Assembly reduced the proportion of the United States contribution for the third consecutive year. Our share is now one-third of the WHO regular budget—the highest that any nation will ever be expected to pay. The sum is relatively small—$2,800,000—by comparison with the costs of disease throughout the world.

Table 1.—*Commissioned officers and civil service personnel as of June 30, 1951*

	Full-time						Part-time (civilian)			
	Grand total full-time	Commissioned officers	Civilian				Total part-time	When actually employed	Without compensation	Other
			Total	Washington metropolitan area	States	Outside United States				
Public Health Service	[1] 15,537	[2] 2,425	13,112	3,702	9,150	260	4,899	[1] 319	[3] 4,273	307
Office of the Surgeon General	786	157	629	585	32	12	25	20	1	4
Immediate Office of the Surgeon General	52	9	43	43						
Division of Civilian Health Requirements	11	1	10	10						
Division of Commissioned Officers	75	14	61	61			2	1		1
Division of Finance	146		146	146			1	1		
Division of International Health Relations	175	119	56	44		12	11	10	1	
Division of Management Services	99		99	99			5	4		1
Division of Personnel	67	1	66	66			1	1		
Division of Public Health Methods	83	3	80	74	6		4	3		1
Division of Supply	59	4	55	38	17					
Details to other agencies	19	6	13	4	9		1			1
Bureau of Medical Services	8,529	1,183	7,346	388	6,784	174	556	179	164	213
Immediate Office of the Chief	15	6	9	7	2					
Division of Administrative Management	99	2	97	97						
Division of Dental Resources	19	7	12	9	3					
Division of Foreign Quarantine	593	50	543	22	429	92	94	2	82	10
Division of Hospital Facilities	107	15	92	58	34		1	1		
Division of Hospitals	7,285	858	6,427	161	6,184	82	442	173	71	198
Division of Medical and Hospital Resources	24	8	16	16						
Division of Nursing Resources	17	6	11	11			3	3		
Details to other agencies	370	231	139	7	132		16		11	5

Bureau of State Services	3,759	744	3,015	948	1,993	74	4,211	69	4,086	56
Immediate Office of the Chief	27	10	17	16	1		9		9	
Division of Administrative Management	74		74	74			1		1	
Division of Chronic Disease and Tuberculosis	478	110	368	302	62	4	16	7	7	2
Communicable Disease Center	1,287	226	1,061		1,045	16	109		82	27
Division of Dental Public Health	91	41	50	19	28	3	7	1	5	1
Division of Engineering Resources	31	14	17	16	1					
Environmental Health Center	206	48	158		158		9	7	1	1
Division of Industrial Hygiene	95	41	54	26	28					
Division of Public Health Education	30	4	26	22	4					
Division of Public Health Nursing	28	25	3	3						
Division of Sanitation	101	65	36	20	16					
Division of State Grants	64	12	52	52						
Division of Venereal Disease	533	72	461	137	317	7	60	16	21	23
National Office of Vital Statistics	208		208	204	1	3	3,990	36	[2] 3,954	
Division of Water Pollution Control	116	40	76	33	43					
Regional Offices, Alaska	390	36	354	24	289	41	10	2	6	2
National Institutes of Health	2,463	341	2,122	1,781	341		107	51	22	34
Immediate Office of the Director	9	4	5	5			3	3		
Office of the Director	656	5	651	647	4		6		1	5
National Institute of Arthritis and Metabolic Disease	280	60	220	218	2		5		2	3
National Microbiological Institute	445	68	377	195	182		5	2	1	2
National Cancer Institute	528	72	456	398	58		17	4	10	3
National Heart Institute	222	64	158	105	53		11	6	1	4
National Institute of Dental Research	48	15	33	26	7		13	11		2
National Institute of Mental Health	165	51	114	82	32		42	25	6	11
Division of Research Grants	110	2	108	105	3		5		1	4

[1] Excludes those part-time employees in nonpay status as of June 30, 1951.
[2] Includes 1,263 Regular officers and 1,162 Reserve officers.
[3] Includes 3,954 collaborating epidemiologists and special agents.

Table 2.—*Statement of appropriations, authorizations, obligations, and balances for the fiscal year 1951*

[In thousands]

Appropriations	Funds available for obligation				Total funds available	Amounts obligated	Balances
	Appropriations and authorizations (less reserves) [1]	Net transfers between appropriations	Repayments for services	Prior year unobligated balances			
Total	$229,441	—$928	$10,080	$93,052	$331,645	$290,882	$40,763
Commissioned officers, pay, etc	1,790		666		2,456	2,351	105
Foreign quarantine service	3,004		1		3,005	2,979	26
Control of tuberculosis	9,400				9,400	9,395	5
Control of venereal diseases	12,864		32		12,896	12,868	28
Assistance to States, general	16,084		15		16,099	16,079	20
Control of communicable diseases	6,165	50	110		6,325	6,289	36
Hospitals and medical care	28,974		6,957		35,931	35,882	49
Operating expenses, National Institutes of Health	14,314	—200	246		14,360	14,252	108
Operating expenses, National Cancer Institute	15,086				15,086	14,612	474
Mental health activities	7,130		18		7,148	6,986	162
Employee health service programs	50		269		319	308	11
Salaries and expenses	2,868		70		2,938	2,901	37
Disease and sanitation investigations and control, Territory of Alaska	1,234				1,234	1,232	2
Operating expenses, National Heart Institute	8,850				8,850	8,494	356
Operating expenses, dental health activities	1,955				1,955	1,942	13
Engineering, sanitation, and industrial hygiene	3,670		13		3,683	3,660	23
Salaries and expenses, hospital construction services	1,257				1,257	1,248	9
Working capital fund, narcotic hospitals			313	67	380	380	
Service and supply fund			1,159	205	1,364	1,364	
Grants for research and training projects				2	2	[2] —27	29
Construction of research facilities	4,748	—623		556	4,681	589	4,092
Payments to States for surveys and programs for hospital construction				100	100	100	
Grants for hospital construction	85,000			91,881	176,881	142,744	34,137
Grants, water pollution control	1,000			5	1,005	967	38
Research facilities, National Institute of Dental Research				1	1	1	
Buildings and facilities, Cincinnati, Ohio	3,800	—3,800		70	70	70	
Operation of commissaries, Division of Mental Hygiene	198		8	15	221	209	12
Payments, Armed Forces Leave Act of 1946		600			600	598	2
Defense, public works, community facilities, General Services Administration				41	41		41
Mutual defense assistance, emergency fund, general area of China, Executive Office of the President				34	34	34	
Salaries and expenses, Bureau of Prisons		1,104			1,104	1,097	7
Salaries and expenses, Philippine rehabilitation, Department of State		1	14		15	14	1
Salaries and expenses, American Sections, International Commissions		55			55	55	
Expenses, Displaced Persons Commission		450			450	194	256
Maritime training fund, Department of Commerce		77			77	76	1
Expenses, Economic Cooperation Administration		197	97		294	254	40
Expenses, China aid, Economic Cooperation Administration		1,161			1,161	557	604
Working fund, Federal Security Agency			92	75	167	128	39

[1] Reserves pursuant to sec. 1214 of the General Appropriation Act, 1951.
[2] Cancellation of prior year obligations.

Table 3.—*Payments to States, Fiscal Year 1951*

[In thousands]

State	Venereal-disease control	Tuberculosis control	General health	Mental-health activities	Heart-disease control	Cancer control	Industrial waste studies	Hospital survey and planning	Hospital construction
Total	[1] $9,883	$6,350	[2] $14,234	$3,074	$1,359	$3,027	[3] $867	$108	$108,096
Alabama	413	144	389	72	55	77	20	----	6,624
Arizona	60	54	96	13	4	12	10	----	752
Arkansas	206	105	288	42	16	53	16	----	3,280
California	221	310	669	193	83	189	28	24	2,457
Colorado	43	59	127	26	23	33	11	----	1,304
Connecticut	30	96	133	38	27	41	12	2	824
Delaware	21	26	22	21	9	6	9	----	265
District of Columbia	176	57	58	22	18	16	10	----	371
Florida	439	150	239	56	35	55	15	----	2,875
Georgia	1,171	209	390	81	55	79	20	7	4,185
Idaho	30	20	83	22	17	20	10	----	519
Illinois	429	298	560	104	46	173	25	2	1,542
Indiana	104	134	324	87	43	82	18	----	1,650
Iowa	56	59	227	53	12	55	15	3	2,149
Kansas	48	87	192	44	31	49	13	4	958
Kentucky	344	178	378	65	50	80	19	4	3,738
Louisiana	504	129	315	56	11	60	17	----	2,273
Maine	22	34	90	14	11	22	11	----	1,778
Maryland	196	140	161	45	30	44	13	----	923
Massachusetts	55	219	344	95	38	108	31	11	2,834
Michigan	172	228	480	127	60	117	22	4	4,569
Minnesota	50	92	284	61	37	57	20	6	1,847
Mississippi	649	158	360	51	28	70	17	----	4,662
Missouri	210	140	361	60	45	91	19	----	2,391
Montana	19	25	66	22	9	15	9	3	482
Nebraska	40	41	106	24	8	23	11	1	798
Nevada	19	11	40	13	8	9	8	----	48
New Hampshire	11	17	55	20	4	----	10	----	697
New Jersey	112	147	326	98	45	87	18	1	1,997
New Mexico	126	44	92	19	18	20	10	----	498
New York	255	448	866	259	74	231	35	----	5,778
North Carolina	550	202	485	43	31	28	23	7	4,682
North Dakota	24	49	76	22	17	19	9	----	444
Ohio	362	279	592	166	72	166	37	6	3,558
Oklahoma	171	110	273	56	31	56	16	2	3,408
Oregon	42	65	164	36	2	27	12	2	1,291
Pennsylvania	290	294	769	155	----	154	34	----	5,536
Rhode Island	16	38	53	22	4	12	10	----	611
South Carolina	413	151	282	52	43	55	16	----	2,651
South Dakota	21	28	66	13	6	16	10	----	443
Tennessee	201	173	368	71	34	53	19	----	3,026
Texas	729	187	687	155	27	145	44	11	7,522
Utah	23	24	91	22	1	8	10	1	663
Vermont	7	21	37	13	----	12	9	----	482
Virginia	228	203	314	74	18	51	17	3	3,629
Washington	47	88	191	51	31	49	23	----	805
West Virginia	187	90	215	45	21	37	14	----	781
Wisconsin	40	109	256	63	16	71	16	----	1,544
Wyoming	15	12	47	2	----	9	9	1	227
Alsaka	18	89	[2] 746	14	12	7	9	----	47
Hawaii	20	64	54	22	17	12	9	----	332
Puerto Rico	218	202	340	52	23	54	19	3	1,330
Virgin Islands	30	18	7	22	3	2	----	----	16

[1] Includes $3,629,347 in cash and $765,028 in services and supplies for rapid treatment facilities and special venereal-disease projects. Does not include expenditures of federally operated centers in Hot Springs, Ark. and St. Louis, Mo.

[2] Includes payment of $694,000 from special appropriation for Alaska disease and sanitation investigation and control.

[3] Excludes $88,908, paid to 7 interstate agencies.

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